The Pan-Pacific Entomologist

Vol. VI, No. 4. April, 1930

A NEW SUBSPECIES OF ASCIA MONUSTE (L.) FROM LOWER CALIFORNIA (LEPIDOPTERA, PIERIDÆ)

BY ALEXANDER B. KLOTS

Cornell University, Ithaca, New York

Through the kindness of Mr. E. P. Van Duzee of the California Academy of Natural Sciences the author has had the opportunity of studying a series of specimens of *Ascia monuste* (L.) from Lower California which represent a very distinct and apparently undescribed geographic race, characterized as follows:

Ascia monuste raza Klots, new subspecies

(See Plate)

Differs from all other *monuste* forms in the following particulars:

Males:

1. Fuscous markings at tips of veins of primaries above uniformly well defined, as shown in figures, never confluent except at extreme margin of wing. Markings at tips of veins of secondaries above more variable, being sometimes nearly absent.

2. Markings at tips of veins of primaries beneath uniformly present and distinct, as shown in figures, of a lighter shade than the corresponding markings above. Spaces between these markings at apex, and often along outer margin, light yellowish white to ochre yellow.

3. Dark markings on secondaries beneath, as shown in figures, uniformly present and distinct, fuscous to brownish fuscous. Ground color of secondaries beneath ranging from a light yellowish white to a deep ochre yellow.

Females:

1. Entire ground color of wings above suffused with light drab gray. Markings, as shown in figure, fuscous, uniformly present.

2. Wings beneath with ground color as above. Dark markings concolorous with those of upper side, less diffuse, uniformly present. A yellow marginal suffusion present between dark markings of apex of primary and along outer margin of secondary as far as anal angle.

The uniformly present and very conspicuous pattern on the underside of the wings, especially of the secondaries, and the drab-gray ground color and heavy pattern above of the females, serve to distinguish this race from all other *monuste* forms. Occasional specimens of *monuste* from mainland Mexico (Mazatlan, Manzanillo) show something of an approach to *raza* in the above-mentioned characters, occupying an intermediate position between *raza* and the form from central Mexico. This is just as would be expected from the geographical relationship of these localities. None of the mainland Mexico specimens show the above combination of characters with any uniformity, nor are any of the characters developed to the extent that they are in *raza*.

One of the specimens of *raza* (see paratype 8 below) in the Grundel collection bore the label *"Pieris erebus."* The author has been unable to find any record of the publication of this name, and concludes that it must have been, at most, in manuscript.

Holotype, male (No. 2630, Mus. Calif. Acad. Sci.), Isla Raza, Gulf of California, April 21, 1921; collector, E. P. Van Duzee. Allotype, female (No. 2631, Mus. Calif. Acad. Sci.), Smith's Island, Angeles Bay, Gulf of California, June 27, 1921; collector, Virgil Owen. Paratypes No. 1, 2, 3, 4, all males, Isla Raza, Gulf of California, April 21, 1921; collector, E. P. Van Duzee. Paratype 5, male, Salinas Bay, Carmen Island, Gulf of California, June 16, 1921; collector, E. P. Van Duzee. Paratype 6, male, Abreojos Point, Lower California, July 31, 1922; collectors, G. D. Hanna and J. R. Slevin. Paratype 7, male, Magdalena Bay, Lower California, May 29, 1925; collector, H. H. Keifer. Paratype 8, male, Lower California; presented by J. G. Grundel; labeled *"Pieris erebus."* Paratype 9, female, Santa Margarita Island, Baja California, July 29, 1922; collectors, G. D. Hanna and J. R. Slevin. Paratype 10, female, Magdalena Bay, Lower California, July 26, 1922; collectors, G. D. Hanna and J. R. Slevin. Paratypes 11-16, all males, Isla Raza, Gulf of California, April 21, 1921; collector, E. P. Van Duzee. Paratypes 17-18, both males, Salinas Bay, Carmen Island, Gulf of California, June 16, 1921; collector, E. P. Van Duzee. Paratype 19, female, Pond Island Bay, Angel de la Guardia Island, Gulf of California, June 30, 1921, collector, E. P. Van Duzee.

Holotype, allotype, and paratypes 1 to 10 are in the California Academy of Sciences. The other paratypes have been deposited as follows: Paratypes 11 and 19 in the American

Museum of Natural History; paratype 12 in United States National Museum; paratype 13 in Carnegie Museum; paratype 14 in Cornell University collection; paratypes 15 and 16 in author's collection; paratype 17 in British Museum; paratype 18, in Hill Museum, Witley, Surrey, England.

Explanation of Plate

Approximately X 3/5

1. Upper and undersides of holotype ♂, *Ascia monuste raza* Klots.
2. Upper and undersides of paratype 6, ♂, *A. monuste raza* Klots.
3. Upper and undersides of allotype ♀, *A. monuste raza* Klots.

Monterey Pine Midge Pupates at Bases of Needles

During the past ten years several published references to the Monterey pine midge, *Thecodiplosis piniradiatæ* (Snow and Mills) have said that pupation takes place in the soil, and that cultivation will control the pest. A careful investigation of the species this season indicates that these references are erroneous, and that Snow and Mills were right when they said that the species pupates at the bases of the needles. In all cases studied, pupation took place in hollowed-out cells at the bases of the needles, usually beneath the scales which form the sheath. Sometimes a few pupæ would be found between the sheaths. The larva forms a papery cocoon and pupates in that.—H. E. Burke.

A NEW EMPOASCA

BY E. P. VAN DUZEE

The following species has been in my collection for a number of years under a manuscript name. It now proves to be of some economic interest, so the description is published to make it available for use in case it is needed.

Empoasca denaria Van Duzee, new species

Allied to *alboscripta* Van Duzee, but smaller with a more pointed head, different arrangement of pale markings and distinct male genitalia. Length, 3.5 mm.

Vertex a third longer than one-half its basal width, distinctly more produced than in *alboscripta,* two-thirds the length of the pronotum; front narrower and flatter than in the related species, its sides almost parallel.

Color yellowish green, becoming almost fulvous in mature dried specimens; vertex with the median line, a spot against each eye and an oblique spot on the front edge either side the apex, white, the latter spots including the distinct ocelli; pronotum with a broad whitish median vitta edged with dusky; a spot behind each eye and one at the middle ivory white; anterior field of scutellum with a pale median line, posterior field with a pale spot on each basal angle; elytral nervures obscure at base; clavus with two pale spots, one subbasal the other at apical one-third and lying against the suture; disk of corium with two pale areas alternating with those on the clavus; costal area subhyaline, apical third of elytra slightly infuscated, with its nervures conspicuously pale, this infuscated portion preceded by a whitish arc, the elytra thus showing ten pale spots, more or less distinct; beneath pale, front ochraceous with a pale median line and subbasal spot either side; tarsi and tip of clypeus touched with bluish green.

The external genital pieces do not differ materially from those of *alboscripta,* but when dissected the styles are found to be much shorter, linear, and curved upward; in *alboscripta* they are longer, almost fusiform, with their apex produced in a spinose tip a third as long as the style, and pale in color, dotted with black. Described from sixteen examples.

Holotype, male No. 2651, and allotype, female No. 2652, Mus. Calif. Acad. Sci., taken by Dr. J. C. Bradley at Leona Heights, near Mills College, Oakland, California, in August, in my collection. Paratypes, six males and five females, same data, and three females taken on artichoke at San Jose, California, in March, received from Dr. H. H. Severin.

NEW RHYNCHOPHORA (COLEOPTERA) FROM WESTERN NORTH AMERICA

BY EDWIN C. VAN DYKE
University of California, Berkeley, California

Tribe Alophini
Genus *Lepidophorus* Kirby

Synoptic Key

1. Scales on pronotum densely and uniformly arranged; setæ of upper surface conspicuously suberect on elytral declivity only 2

   Pronotal scales arranged in a median and lateral stripes, the intervening area quite bare of scales; setæ of pronotum, as well as of entire elytra, conspicuous and more or less semi-erect throughout 3

2. Elytral intervals entirely flat, setæ equally evident on all intervals; abdomen densely clothed with scales and sparsely pilose, the last ventral more finely and densely pilose and with a shallow impression at most. Alaska..... ..... *lineaticollis* Kirby

   Elytral intervals slightly convex apically. Setæ distinct only on alternate intervals; abdomen clothed with scales and with scattered, prostrate setæ, the last ventral of males with a deep fovea at apex. Mount Rainier, Washington ..... *rainieri* n. sp.

3. Elytra with intervals all more or less flattened, the setæ present on all intervals anteriorly but only distinct on alternate ones posteriorly; abdomen sparsely setose, the last ventral broadly and shallowly impressed. New York, Maryland, West Pennsylvania, and Virginia..... *setiger* Ham.

   Elytra with intervals alternately elevated, the setæ present on all intervals anteriorly but absent on alternate ones on elytral declivity. Abdomen moderately scaly and setose. Coastal area of Washington and Oregon..... *alternatus* n. sp.

Lepidophorus rainieri Van Dyke, new species

Oval, convex, piceous, antennæ and legs reddish brown; densely clothed above with small, round brown or white scales, the latter forming median and lateral stripes on the pronotum and a more or less nebulous marking along the sides of the elytra, as well as being more or less scattered over the disk; setæ short, semi-erect on the head, scattered and prostrate over the pronotum, and in rows on the alternate intervals of the elytra, quite prostrate in front and semi-erect on the declivity. Beak dilated apically, somewhat flat-

tened above and rugosely punctured. Prothorax as broad or broader than long, convex; sides narrowed at base, somewhat parallel at middle and narrowed and constricted at apex; disk rather densely and coarsely punctured, the punctures in fresh specimens concealed by the scales. Elytra not quite twice as wide as prothorax; striæ broad and flat in front and faintly convex toward apex, these striæ well impressed and rather closely punctured with somewhat elongate punctures, each of which bears a small scale. Beneath rather densely clothed with silvery scales and short, recumbent and scattered setæ; last ventral segment deeply impressed near apex in males and more shallowly in the females. Length, 5 mm.; breadth, 2.25 mm.

Holotype, allotype (Nos. 2632, 2633, Mus. Calif. Acad. Sci.), and several designated paratypes from a series of eighteen specimens collected by myself from beneath stones, July 14-31, 1905, at about 6000 feet altitude, on the slopes of Paradise Valley, Mount Rainier, Washington, in my collection.

This species rather closely resembles the well-known *lineaticollis,* the type of the genus, but is in general less robust, has the elytral setæ only on the alternate elytral intervals, the ventral setæ less hairlike and in the female less dense, and the last ventral segment deeply impressed in the male.

Lepidophorus alternatus Van Dyke, new species

Oval, convex; brown, legs and antennæ somewhat rufous; head and elytra rather densely clothed above with small, round brown or yellowish white scales, the scales of the pronotum light and mostly condensed into a median and lateral stripes, the lighter scales also more evident along the sides of the elytra and in irregular transverse patches near the center of the disk; setæ rather conspicuous, slightly elevated, scattered over the head and pronotum, more evidently elevated and arranged in rows on the alternate elytral intervals, with a few scattering ones on the even intervals anteriorly. Beak dilated apically, somewhat flattened above, with, at times, an indistinct median crista, and rugosely punctured. Prothorax slightly longer than broad, convex; sides evenly arcuate, narrower in front than at base but not constricted; disk densely, coarsely, somewhat cribrately punctured. Elytra less than twice as wide as prothorax, the alternate intervals somewhat elevated and convex throughout, the even intervals flattened in front and slightly convex behind; striæ evidently impressed and rather closely punctured with deep, round punctures, from each of which projects a short setiferous scale. Beneath moderately densely clothed with whitish scales and recumbent, scattered yellow setæ, the last ventral segment but shallowly impressed near the apex even in the male. Length, 5 mm.; breadth, 2.5 mm.

Holotype (No. 2634, Mus. Calif. Acad. Sci.), and numerous designated paratypes from a series of forty-four specimens collected by myself at Forks, Clallam County, Washington, July 2 and 5, 1920, in my collection. These were beaten from low herbage on the margins of a boggy clearing in the forest. I have also another specimen which I collected at Cannon Beach, Oregon, June 9, 1926, and in the California Academy collection there is another series of specimens taken by Mr. E. P. Van Duzee at Forks, Washington, on the same date that I collected my specimens.

This species rather closely resembles *setiger,* with a specimen of which, kindly presented by Dr. H. C. Fall, it has been carefully compared. It differs by being much larger and more robust, with the alternate elytral intervals more or less distinctly elevated, the setæ coarser and more clubbed, and the funicle of the antennæ longer, the first and second segments distinctly longer than in the other, and the outer segments less transverse. The closely related *setiger* and *alternatus* are probably species of the dense forests while the equally closely related *lineaticollis* and *rainieri* are restricted to the more open country.

Tribe Myrmecini (Otidocephalini)

Myrmex (Otidocephalus) ventralis Van Dyke
new species

Narrow and elongate, black, moderately clothed above with soft white pile, erect and directed forward on the pronotum and loosely appressed on the elytra, and with rows of short, erect, and sparsely placed black setæ also on the elytra. Head moderately coarsely, densely punctured; eyes of moderate size and slightly convex; beak short, robust, bistriate laterally, the median carina extending from between the eyes almost to the apex; antennæ piceous, the club elongate and robust. Prothorax nearly one-fourth longer than broad, convex; sides moderately arcuate at center; disk coarsely, densely, somewhat cribrately punctured, a well-defined median crista extending from base almost to apex. Elytra somewhat more than twice as long as prothorax, about one-fourth broader at base than prothorax, with sides almost straight or just perceptibly arcuate and diverging to posterior third from whence they are gradually rounded to apex; disk moderately finely, closely, and irregularly punctured. Beneath rather densely punctured and densely clothed with subrecumbent, radiate-pectinate, white hairs; each femora with distinct

tooth, and the front tibiæ slightly sinuate within. Length (without beak), 6 mm.; breadth, 2.5 mm.

Holotype (No. 2635, Mus. Calif. Acad. Sci.), a unique, collected in the Chisos Mountains, Brewster County, Texas, July 18, 1921, by Mr. C. D. Duncan.

This species approaches quite closely to *M. estriatus* (Casey), but it differs by being black, not rufous or rufopiceous, more elongate and narrower, with less globular afterbody, the white pile finer and denser above, the elytral setæ shorter and more numerous, the pronotal punctures more uniformly disposed, the elytral punctuation finer and the underside densely clothed throughout with short, radiate-pectinate hairs, whereas in the other the pile is sparse and similar to that of the upper surface except for an occasional pectinate-radiate hair forward and at sides.

Myrmex dimidiatus Van Dyke, new species

Narrow and elongate, the elytra and ventral surface of abdomen black, the remaining portion of body rufous, tibiæ somewhat darkened; body rather sparsely clothed with long, erect black hair, on the elytra arranged in rows on the intervals, the hair of the middle and hind legs mostly white, and the scutellum, meso- and metapleuræ densely clothed with recumbent radiate-pectinate white hairs. Head rather sparsely punctured; eyes moderately convex and well separated; beak short, robust, bistriate laterally and sparsely punctured basally, the median carina well marked at base only; antennæ rufous, club elliptical. Prothorax one-third longer than broad, convex; sides moderately arcuate at center; disk sparsely, rather finely punctured, more closely at base and apex. Elytra twice as long as prothorax, slightly broader at base than prothorax though one-fourth broader at middle; sides sinuate and diverging behind humeri, arcuate at center and converging to apex; disk with striæ faintly impressed and with rows of well-marked, elongate, rather closely placed punctures, the intervals flat, with rows of finer and more sparsely placed punctures. Beneath rather finely, sparsely punctured and shining. Length, 4.75 mm.; breadth, 2 mm.

Holotype (No. 2636, Mus. Calif. Acad. Sci.), a unique from the Davis Mountains, Texas, collected May 14, 1927, by Mr. J. O. Martin.

This bicolored species could only be confused with others of like coloration; *dichrous* (Lec.) from Florida has the base of the elytra also rufous, the punctures of prothorax and elytra denser and coarser and with no erect pile; *basalis* (Schaef.)

from Arizona, has the red color limited to the base of elytra, and is stouter and clothed with a double type of pile above; while *diversicolor* (Champ.), from Central America, also has the red color more limited, and differs otherwise.

MYRMEX OCTOLINEATUS (Champ.)

A number of specimens of this Mexican species are in the collection of the California Academy of Sciences, taken at the following localities in Arizona: fourteen miles east of Oracle, July 27, 1924, by Mr. E. P. Van Duzee; and Texas Cañon, Chiricahua Mountains, September 8, 1927, by Mr. J. A. Kusche. This species is not included in the Leng catalogue.

MYRMEX ESTRIATUS (Casey)

The California Academy of Sciences has specimens of this species from southwestern Texas, southwestern Colorado, the Chiricahua Mountains of Arizona, as well as from New Mexico. Specimens collected near Los Vegas Hot Springs, New Mexico, by Mr. Weld were bred from woody stem galls on oak.

MYRMEX ARIZONICUS (Schaef.)

A series of this species was taken near Camp Potwisha, Sequoia National Park, California, during May 1929. It was first beaten from mistletoe. *Phoradendron villosum* Nutt., on white oak, *Quercus lobata* Nee, by Mr. Walter Lammerts, and later was dug out from its pupal chambers in the stems of the mistletoe.

Tribe Zygopini

Cylindrocopturus vanduzeei Van Dyke, new species

Moderately elongate, the entire underside including the feet and most of the dorsal surface clothed with large, chalky white scales, opalescent in strong light; the remaining surface ornamented with ochraceous scales which are condensed near the anterior margin of the prothorax at the angles, and on either side of the median line of the disk, more broadly near the base; they form an irregular band extending from the base of the elytra at the outer side of the humeri in the form of a lunule directed toward the middle of the suture, thence zigzagging backward almost to the apex, leaving white areas in the form of a broad triangle at the base, a band three intervals wide on either side of the suture, and a small triangular spot at the sides posteriorly. Head with eyes well separated, the interocular area narrowest at middle, the beak robust, rather coarsely punctured

at the sides from base to apex, the second funicular segment just perceptibly shorter than the first and the antennal club moderately wide. Prothorax as long at sides as broad, the sides slightly narrowing forward and sinuate. Elytra gradually arcuately narrowed posteriorly, suddenly depressed before the apex, with apical margin slightly elevated. Hind margin of second ventral segment faintly bituberculate near the middle. Length, 4 mm.; breadth, 1.75 mm.

Holotype (No. 2637, Mus. Calif. Acad. Sci.), and one paratype belonging to the California Academy of Sciences, collected by Mr. E. P. Van Duzee at Independence, Inyo County, California, June 15, 1929.

This very pretty little species should perhaps follow *princeps* Fall, according to his key.[1] It is also closely related to the recently described *mediatus* Carr, but is smaller, with wider interocular area, and larger scales.

Cylindrocopturus crassus Van Dyke, new species

Robust, subelliptical; black, the underside clothed with slaty gray scales of various shades, the upper with dark slaty colored scales except for a few white scales forming a line along the lateral margin of the pronotum, and on the elytra a spot at the humeri, short lines near the scutellum on the second and third intervals, a short transverse bar at the posterior third from the first to the third or fourth interval, a small spot on the eighth slightly in advance of the preceding, and a series of slaty gray scales extending obliquely outward and backward from just back of the scutellar white scales. Head with eyes well separated, the interocular space narrowest at center and rapidly widening both above and below; beak robust, rather coarsely punctured at the sides from base to apex, second funicular segment slightly shorter than first, and antennal club robust and fusiform. Prothorax slightly broader than long, sides somewhat arcuate posteriorly, narrowed and constricted in front. Elytra rather broadly arcuate at sides, faintly sinuate posteriorly, the disk distinctly convex, compressed before the apex, and the apices slightly divergent. Hind margin of second ventral segment faintly bituberculate at center, each tubercle with a tuft of erect scales. Length, 3.5 mm.; breadth, 1.75 mm.

Holotype (No. 2638, Mus. Calif. Acad. Sci.), and five paratypes from a series of eight specimens, two injured, under No. 29,441, submitted to me by the California State Department of Agriculture through Mr. Hartford Keifer. They were

1 New species of American Coleoptera of the Tribe Zygopini, by Henry C. Fall, Trans. Am. Entom. Soc., Vol. XXXII, pp. 53-61, 1906.

reared from chrysanthemum in San Mateo County, California, November 18, 1929.

This robust and elliptical species may follow the preceding, but it has a facies all its own. The markings of the elytra are variable, the white scales often being more numerous than in the type and the slaty gray scales sometimes covering most of the disk.

Cylindrocopturus hemizoniæ Van Dyke, new species

Moderately elongate, black, the underside clothed with grayish and grayish brown scales; upper side clothed with brown scales of several shades except for a series of white scales on the occiput, at times forming a stripe down the middle and along the sides of the pronotum, a spot at the humeri, one on the third and fourth intervals behind the middle and one on the eighth interval slightly in advance of the preceding, the sutural intervals also often of a light shade. Head with eyes well separated, the interocular space gradually narrowed to the center, the beak robust, coarsely and closely punctured on sides toward base, more finely apically, the second segment of funicle almost as long as the first, the antennal club robust. Prothorax as long as broad, sides subparallel behind, slightly sinuate and narrowed or slightly constricted in front. Elytra with the sides moderately arcuate, somewhat sinuate before the middle, the disk flattened, and the apical area depressed. Hind margin of second ventral segment nontuberculate. Tarsi with but a few gray scales on second segment. Length, 4.25 mm.; breadth, 1.75 mm.

Holotype (No. 2639, Mus. Calif. Acad. Sci.), and several designated paratypes from a series of thirty-two specimens reared at San Jose, California, April 15 and May 1, 1928, by Mr. L. M. Smith. This species lives in the stems of one of our native tarweeds, *Hemizonia congesta* DC.

This species is, of course, variable as to size, most specimens being somewhat smaller than the type, but it is also variable as to color, the gray or lighter brown scales often replacing most of the dark brown of the elytral disk. A superficially close resemblance in size and shape is shown to *C. longulus* Lec., but it differs by having a shorter, more robust and heavily punctured beak, more widely separated eyes, the elytral intervals flat, never convex, and the darker scales dull, never coppery as they are in *longulus* and its varieties.

Cylindrocopturus cretaceus Van Dyke, new species

Small, elongate, clothed with large chalky white scales over the

undersurface and much of the upper, the disk of pronotum with two broad bands of somewhat brownish scales, the propleuræ and disk of elytra also often similarly clothed to a great extent as in the type, though sometimes with but a minimum of brown scales. Head with eyes fairly well separated, the interocular space narrowest at middle; beak stout, slightly cristate and rather coarsely, closely punctured from base to apex; second funicular segment subequal to first, the antennal club well formed. Prothorax as long as broad; sides slightly sinuate and subparallel, constricted near apex. Elytra with sides somewhat arcuate, gradually narrowing posteriorly, the disk flattened and the apex rather suddenly depressed. Hind margin of second ventral segment nontuberculate. Length, 3 mm.; breadth, 1.25 mm.

Holotype (No. 2640, Mus. Calif. Acad. Sci.), collected fourteen miles east of Oracle, Arizona, July 27, 1924, by Mr. E. P. Van Duzee, and two paratypes, one collected at the same locality as above by Mr. J. O. Martin, the other at Nogales, Arizona, August 27, 1906, by Mr. F. W. Nunenmacher, all in the collection of the California Academy of Sciences.

This small elongate species belongs near *longulus,* but it is not only generally smaller but is without bronzed scales, with the white scales more densely, uniformly placed and larger, the interocular area broader and with its lateral boundaries more arcuate, the beak stouter and more curved, and the entire disk in general flatter. There is, as usual, some variation, the paratypes being smaller than the type and more uniformly white in color.

Cylindrocopturus unicolor Van Dyke, new species

Elongate, subparallel, clothed above as well as beneath with scales of a uniform white color. Head with eyes rather widely separated, the interocular space two-thirds the width of an eye, depressed so as to form a shallow sulcus between the eyes, with a minute longitudinal crista above and as usual narrowest in the middle; beak stout, distinctly arched and rather coarsely punctured from base to apex; second funicular segment just perceptibly shorter than the first, the antennal club well formed. Prothorax slightly broader than long, with sides almost parallel for basal two-thirds and faintly sinuate as well, narrowed and constricted at apex, the disk barely convex and cribrately punctured, the punctures in most cases concealed by the scales. Elytra with sides almost parallel at basal half, thence gradually arcuately narrowed posteriorly and sinuate slightly in advance of apex, the disk flattened and gradually declivous near

apex. Hind margin of second ventral segment nontuberculate. Length, 4 mm.; breadth, 1.5 mm.

Holotype in my collection (No. 2641, Mus. Calif. Acad. Sci.), taken by myself at San Francisco, California, and paratype, somewhat smaller, collected by Dr. F. E. Blaisdell at Del Monte, Monterey County, California, July 25, 1924, in his collection.

This species simulates *cretaceus* in general shape and appearance except that it is proportionally longer, with the scales smaller, of a more uniform color, more pearly and less of a chalky white, the interocular space broader, the beak more robust and arched, the elytra gradually declivous to apex and the ventral segments likewise more gradually narrowed. Its more parallel shape, more flattened dorsum, lack of color pattern, broad interocular space, and more robust and arched beak will also readily separate it from any of the phases of *longulus*.

Cylindrocopturus longulus (Lec.)

After examining a large series of specimens from many places in the western part of our country, and with a knowledge of their food trees furnished by Dr. H. E. Burke and others, I am forced to conclude that this species is not only of wide distribution but very variable as to color pattern and quite catholic as regards its food plants. I thoroughly agree with Fall[2] in placing *nubilatus* (Casey), *subcupreus* (Casey), *obscurellus* (Casey), *mucidus* (Casey), and *dispersus* (Casey) with *longulus* (Lec.) as mere color phases and would even go further and include *lunatus* (Lec.). All of these breed in coniferous trees. Typical *longulus* breeds in Douglas fir, *Pseudotsuga taxifolia* Britt, the lodgepole pine, *Pinus murrayana* Balf., and the true fir, *Abies*. Specimens answering perfectly to the original description have been bred from grand fir, *Abies grandis* Lindl., on Vancouver Island, by Mr. A. N. Chells, and from lodgepole pine in the Yellowstone Park by Dr. H. E. Burke. Typical *nubilatus*, which differ only in having the white scales more diffused, have been taken along with *longulus* from the Monterey pine, *Pinus radiata* Don., at Carmel, California, close to the type locality for the former. Other specimens

2 Trans. Amer. Ent. Soc., Vol. XXXII, p. 54, 1905.

some of which agree with the description of *mucidus,* have been taken on Mount Hood, Oregon, at various places in northern California, as well as at Idlewild on Mount San Jacinto in southern California, from the western yellow pine, *Pinus ponderosa* Dougl. Dr. Burke has also submitted two specimens which belong with these, one taken from sugar pine, *Pinus lambertiana* Dougl., the other from the lodgepole pine. A beautiful little variety, entirely bronzed above except for a short white bar back of the middle of the elytra, has been bred at Palo Alto, California, by Dr. Burke from both the Douglas and the white fir, *Abies concolor* Lindl. and Gord., and I have seen specimens of the same from Marin County, California, as well as from Corvallis, Oregon, where presumably it lives on the Douglas fir. Specimens which tally exactly with the description of *lunatus* (Lec.) have also been taken in Marin County as well as elsewhere. This species, judging from the material before me, appears thus to vary from specimens almost entirely clothed above with white scales to those almost entirely bare of white scales, with the true *longulus* as the intermediate color phase.

Tribe Cryptorhynchini

Conotrachelus cinereus Van Dyke, new species

Robust, piceous, the elytra moderately densely clothed with small, narrow, light brown and broader white scales, the latter assembled to form more or less transverse spots here and there over the surface, each elytral interval also with a row of sparsely placed, minute, erect white setæ, the rest of the surface more sparsely clothed, the prothorax also ornamented with two white spots and the femora banded with white at the middle. Head moderately coarsely, densely punctured; a well-defined fovea between the eyes; the beak long and slender, slightly less than one-half the length of the body, distinctly striate at base and rather finely punctured; the antennæ inserted at middle of beak, first funicular segment but four-fifths the length of the greatly elongated second segment, the third and fourth together about equal in length to the second, the third a bit longer than the fourth. Prothorax slightly wider than long, the sides broadly arcuate to anterior third, then suddenly constricted and sinuate to lobed apex; the disk with a well-defined, complete median longitudinal carina, and the surface rather coarsely, closely and somewhat cribrately punctured. Elytra about one-third broader than prothorax and two and a quarter times as long, the humeri prominent but rounded, sides arcuate, and the posterior two-thirds gradually nar-

rowed to rounded apex; disk with third, fifth, seventh, and ninth intervals elevated and cristate almost to apex, the even intervals flat, and the striæ faintly impressed, with rather large and closely placed punctures. Beneath coarsely, closely punctured, a deep triangular impression on last ventral. Mesosternum protuberant in front. Front and middle femora slightly prominent where tooth should be, and hind femora with a distinct but not prominent tooth. Claws divergent and toothed. Length, 6.5 mm.; breadth, 3.25 mm.

Holotype (No. 2642, Mus. Calif. Acad. Sci.), a unique specimen collected at Austin, Texas, December 7, 1928, by Mr. J. O. Martin.

This rather large and robust species belongs in the *cratægi* group of the genus and is perhaps nearest to *adspersus* Lec. and *invadens* Fall, but differs from both by the shape of the prothorax, somewhat cordate elytra, and coloration, as well as by the distinctly cristate alternate elytral intervals and broad, flattened, even intervals. The distinctly striate beak and different lengths to the funicular segments also differentiates it. It is strange that such a conspicuous species from eastern Texas should have remained so long unknown.

Conotrachelus asperatus Van Dyke, new species

Short, robust, dark brown, sparsely clothed above with brown and yellowish white scalelike hair, the latter more or less arranged in transverse bars across the elytra, and with short erect setæ, the shorter inclined forward on the pronotum, and the longer inclined backward and arranged in rows on the intervals. Head moderately closely, coarsely punctured, a yellowish squamous hair arising from each puncture; beak robust, slightly arcuate, as long as head and prothorax, carinate above, tricarinate laterally, moderately punctured and with short semi-erect setiferous hairs; antennæ inserted at outer third of beak, second funicular segment slightly longer than first, third and fourth short, together but little longer than second. Prothorax about as wide as long, sides almost straight or faintly arcuate at basal two-thirds and suddenly constricted near apex; disk coarsely punctured, cribrate and without carina. Elytra two-fifths wider than prothorax and over twice as long, cordiform, humeri prominent but rounded, sides arcuate and gradually narrowed from base to apex; disk with alternate intervals slightly elevated and carinate, the even intervals flat, with a row of coarse, well-separated punctures on either side, the basal margins of each puncture elevated so as to form short, transverse, smooth rugæ or asperities. Beneath very coarsely, closely punctured, a short hair arising from each puncture. Mesosternum prominent but not protuberant. All femora with a

single large tooth, tarsal claws divergent and toothed. Length, 5 mm.; breadth, 2.5 mm.

Holotype (No. 2643, Mus. Calif. Acad. Sci.), a unique collected at an altitude of 9000 feet, in Bear Foot Park, Chiricahua Mountains, Arizona, July 29, 1927, by Mr. J. A. Kusche, in my collection.

This species, because of its elytral asperities, is readily separated from its somber relatives. Because of its cribrate and noncarinate pronotum it should come before *cribricollis* (Say) which it simulates in size and general appearance though it is more elongate, with the punctures of pronotum not quite so large and the alternate elytral intervals evidently elevated and carinate.

Conotrachelus setiferous Van Dyke, new species

Rather small, short and robust, brown, the upper surface clothed with brown and gray appressed scalelike hair, and longer, erect, coarse setæ, shorter on head and pronotum and inclined forward and longer on the elytra, slightly inclined backward and arranged in rows on the elytral intervals. The gray hairs are rather generally dispersed though most noticeable on the front of the head, in the form of an arcuate line near the sides of the pronotum, and in spots at base of the third intervals; they are more or less massed about the humeri and along the sides, and form several evident spots on the alternate intervals near the declivity of the elytra, thus giving them a tesselated appearance. Head closely, coarsely punctured, the squamous hair arising from punctures; beak robust, slightly arcuate, as long as prothorax, carinate above and at sides, and punctured laterally in basal portion; antennæ inserted at outer third of beak, second funicular segment about as long as first. Prothorax broader than long, sides rather broadly arcuate, constricted near apex, the disk coarsely, cribrately punctured, and without a carina. Elytra two-fifths wider than prothorax and nearly three times as long, humeri prominent, rounded, sides arcuate and gradually narrowed toward apex, with a slight sinuation just before the apex; the disk with striæ shallow but coarsely, closely punctured; all intervals moderately equally elevated and convex. Beneath coarsely punctured, with short squamous hairs arising from each puncture. Mesosternum prominent, slightly protuberant. All femora armed with a single, well-defined tooth, tarsal claws divergent and toothed. Length, 4.5 mm.; breadth, 2.5 mm.

Holotype (No. 2644, Mus. Calif. Acad. Sci.), a unique collected at Patagonia, Arizona, August 3, 1924, by Mr. E. P. Van Duzee.

This species belongs near the preceding, but can readily be separated by its smaller size, the presence of very robust, erect setæ, equally elevated elytral intervals, the absence of asperities, more transverse prothorax, shorter body, and the color pattern. It closely simulates *cribricollis* in size, shape and color pattern, but has a more transverse prothorax, less coarse prothoracic punctures, and longer setæ.

Conotrachelus nigromaculatus Van Dyke, new species

Short and robust, reddish brown with an irregular black area along the anterior half of the elytral suture; somewhat expanded in front and widened out into a transverse bar behind the middle; the upper surface sparsely clothed with white and yellowish white scale-like hair, most evident about the humeri and apical declivity, with fine setæ, sparse, short and inclined forward on head and pronotum, and longer, slightly bent backward and arranged in rows on the elytral intervals. Head coarsely, closely punctured, the beak robust, slightly curved, as long as head and prothorax, carinate above and laterally and coarsely punctured except at apex; antennæ inserted at outer third, the second funicular segment somewhat longer than first. Prothorax somewhat broader than long, the sides arcuate and narrowed from base and constricted before apex; the disk coarsely, cribrately punctured and without a carina. Elytra two-fifths wider than prothorax and about twice as long, the humeri prominent but rounded, the sides arcuate and gradually narrowed toward apex, the disk with striæ coarsely and shallowly punctured, all intervals moderately elevated, with the alternate ones somewhat carinate. Beneath coarsely punctured, with short hair arising from each puncture. Mesosternum prominent and but slightly protuberant. All femora unidentate, the tarsal claws approximate and cleft. Length, 4.5 mm.; breadth, 2.5 mm.

Holotype (No. 2645, Mus. Calif. Acad. Sci.), and one paratype, collected at Silver Creek, Chiricahua Mountains, Arizona, altitude 4500 to 6000 feet, October 7, 1927, by Mr. J. A. Kusche, in author's collection.

This species belongs near *echinatus* Horn, but is considerably larger, differently colored and with alternate elytral intervals evidently carinate.

Rhyssematus beutenmuelleri Van Dyke, new species

Short, oval, robust; black, antennæ and tarsi rufous, subopaque, legs, undersurface, and much of elytra clothed with oval gray scales. Head rather coarsely punctured, partly clothed with gray scales, with a few erect black scales in front; eyes separated by a distance

equal to their own breadth, a small fovea between eyes; beak longer than prothorax, not depressed at base, grossly punctured basally and smooth apically. Prothorax one-fourth broader at base than long, sides arcuate and converging from base to beyond middle, thence sinuate and constricted to apex, the disk with well-elevated central crista and elsewhere rather coarsely and densely punctured, without trace of strigæ but with numerous erect black scales (it is possible that in fresh specimens these clothed all of the disk). Elytra about one-sixth wider than prothorax and twice as long, sides gradually arcuate from base almost to apex, where somewhat constricted; disk with suture slightly elevated and the third, fifth, seventh, and ninth intervals sharply cristate from base to apex, with two rows of coarse, deep, oblong punctures between the cristæ; the general surface finely granular and subopaque. Body beneath somewhat coarsely, closely punctured and opaque. Intermediate and posterior tibiæ not toothed or angulate some distance before the apex, each femur with a moderate tooth, the anterior coxæ fairly well separated. Length, 4.5 mm.; breadth, 3.75 mm.

Holotype (No. 2646, Mus. Calif. Acad. Sci.), a unique specimen in my collection, taken in the Black Mountains of North Carolina, May 30, 1912, by Mr. William Beutenmueller.

This rather small black species can readily be separated from any of our other eastern species by its more or less uniformly punctured pronotum, lack of pronotal rugæ and the presence of scaly vestiture.

Rhyssematus arizonicus Van Dyke, new species

Moderately elongate, oval, robust; black, antennæ and tarsi rufopiceous, somewhat shining, the elytra, legs and undersurface sparsely clothed with very fine and short white hair. Head moderately coarsely and closely punctured, a yellowish scalelike hair arising from each puncture; eyes very narrowly separated; beak not longer than prothorax, robust and but slightly curved, not depressed at base, coarsely punctured throughout basal area, smoother and more finely, sparsely punctured toward apex, with a sharply defined medial carina and several less distinctly marked lateral ones near the base. Prothorax twice as broad at base as long, sides slightly arcuate and rapidly converging toward apex before which it is slightly constricted, the disk with fine though distinct and complete median crista and numerous well-defined irregular though generally longitudinally arranged rugæ, more prominent at sides. Scutellum finely punctured. Elytra slightly wider at humeri than prothorax and about three times as long; sides sinuate posterior to humeri, thence gradually arcuately narrowed to base; disk with suture slightly elevated and with third, fifth, seventh, and ninth intervals cristate

from base to apex; eighth and tenth cristate at base, with two rows of coarse, deep oblong punctures between the cristæ; general surface irregularly punctured and rugose. Body beneath coarsely and rather closely punctured, the last ventral segment much more finely and closely punctured. Front coxæ slightly separated, each femur with a well-defined tooth; the intermediate and posterior tibiæ without defined teeth on outer surface before apex. Length, 7 mm.; breadth, 4.5 mm.

Holotype (No. 2647, Mus. Calif. Acad. Sci.), and paratype from Prescott, Arizona, collected August 13, 1909 and June 20, 1909, by Mr. J. A. Kusche, and two paratypes from Dewey, Arizona, in my collection.

This species does not fit the description of any of the Mexican species and among our own species would come closest to *lineaticollis* Say, from which it differs by being slightly larger, more elongate, with the sides of the prothorax straighter and more oblique, the dorsal crista better defined, the elytra distinctly rugose and shining, not minutely granular and subopaque, and by having a fine though sparse pubescence.

RHYSSEMATUS ACUTECOSTATUS Champ.

This large Mexican species may now be added to our list. It differs from the preceding by being slightly larger, more piceous, with the head and beak at base coarsely, rugosely punctured, the frontal striæ less complete and more oblique, the minute hair yellowish, the middle and posterior tibiæ toothed or angulate on their outer edge some distance before the tip and with the space between this and the outer apical angle more or less concave and ciliate. A specimen of this species is in the collection of the California Academy of Sciences which was taken at Badger, Santa Cruz County, Arizona, July 31, 1924, by Mr. J. O. Martin.

Chalcodermus martini Van Dyke, new species

Short, oval, convex, black, antennæ rufopiceous, elevated portions slightly shining, and conspicuously clothed with a sparse, erect, white setiferous pile, giving the insect a grayish appearance. Head alutaceous, rather coarsely, closely punctured in front; beak distinctly longer than prothorax, slightly curved, coarsely punctured at base and sides; eyes separated in front by about one-half the breadth of the beak. Prothorax one-fourth wider at base than long; sides slightly arched and convergent until near base, where rather suddenly con-

stricted; disk very coarsely punctured, the intervals between punctures elevated into a series of longitudinal rugæ at middle and irregular reticulations laterally, the reticulation gradually disappearing at sides beneath. Elytra somewhat over one-fifth broader at base than prothorax, sides almost parallel at basal two-thirds, thence gradually rounded to apex; disk with rows of very large, deep, and rather closely placed punctures, the intervals slightly elevated and convex and sparsely, very finely punctured. Beneath coarsely punctured, the last ventral segment more finely and closely. Length (without beak), 4.75 mm.; breadth, 2.75 mm.

Holotype (No. 2648, Mus. Calif. Acad. Sci.), a unique collected by Mr. J. O. Martin in Sabino Cañon, Santa Catalina Mountains, Arizona, August 13, 1924.

This species, because of its conspicuous cinereous vestiture, deep punctuation, and well-elevated intervals, stands apart from all of its fellows and thus should be easily recognized. It seems to resemble no Mexican species.

Tyloderma morbillosa (Lec.)

This species, described as having been taken in San Francisco, has not since been collected there. Recently, however, it has been secured in numbers by Mr. W. W. Baker of the Western Washington Agricultural Experiment Station near Grand Mound, in western Washington. It is reported as being quite injurious to strawberries.

Cophes gibbus Champ.

Three Arizona specimens of this large gray weevil, never before reported from north of Mexico, have recently been seen. The genus is close to *Cryptorhynchus,* but differs primarily by having the anterior tarsi in the males greatly dilated and fringed with long hairs on the inner side. Two of the specimens seen belong to the California Academy of Sciences, one a male, collected by Mr. E. P. Van Duzee near St. Xavier Mission, Tucson, Arizona, July 29, 1924, and the other, a female, collected by Mr. J. O. Martin in Florida Cañon, Santa Rita Mountains, Arizona, August 10, 1924. The third specimen is in the collection of the Oregon Agricultural College and was taken by Prof. W. J. Chamberlin, also in the Santa Rita Mountains and on July 24.

Subfamily Calendrinæ

Calendra (Sphenophorus) sequoiæ Van Dyke new species

Rather small, somewhat elongated, subparallel; black, varying to reddish; undersurface and more elevated portions of upper shining, the depressed areas velvety (in fresh specimens). Rostrum slightly more than half as long as prothorax, moderately arcuate and compressed. Surface at base rather strongly and numerously punctured, base strongly dilated above scrobes, where it is acutely angled; interocular fossa deep and without channel in front. Front of head rather finely punctured. Prothorax about one-sixth longer than broad, widest at middle; sides slightly arcuate, suddenly and strongly constricted at apex; disk with vittæ well marked, the median Y-shaped, narrowed behind, the arms in front broad and arched to enclose the deep elliptical apical fossa, the lateral vittæ broad and more or less united with the median in front of middle; all vittæ rather finely punctured, the V-shaped depression between them at base very coarsely punctured, elsewhere less coarsely so. Scutellum declivous and channelled. Elytra more than one-sixth broader than prothorax and one-fourth longer, gradually narrowed to apex; disk moderately convex, the striæ fine but coarsely, deeply and somewhat remotely punctured, giving the intervals a crenulate appearance; the alternate intervals broader, distinctly elevated and finely, uniseriately punctured except the third which is biseriately punctured near base; humeral and subapical callosities well marked, smooth and shining. Beneath distinctly punctured throughout, the punctuation closest on metasternum. Legs finely and sparsely punctured, tibiæ feebly fimbriate on inner side, anterior tibiæ with outer angle protuberant, the others obliquely truncate, with inner angle produced into a long spur. Pygidium coarsely, closely punctured behind, more finely in front, and with minute tufts of silvery hair each side of apex. Length (excluding beak), 7.5 mm.; breadth, 3.25 mm.

Holotype (No. 2649, Mus. Calif. Acad. Sci.), and nine paratypes, collected by myself from near Camp Potwisha, altitude 2100 feet, Sequoia National Park, California, June 13, 1929, in my collection.

This species belongs in the *placidus* group of the genus as defined by Chittenden,[3] and should perhaps be placed in the series with *neomexicanus* Chitt. and *phœniciensis* Chitt. From the former, the fine punctuation of the pronotal vittæ and the regular and fine punctuation of the elytral intervals will separate it; and from the latter, the elevation of the alternate intervals and coarse strial punctuation will distinguish it.

[3] On the species of Sphenophorus hitherto considered as Placidus Say, Proc. Ent. Soc. Wash., VI, No. 3, pp. 130-137, June 25, 1904.

CONCERNING SCIENTIFIC NAMES

BY E. P. VAN DUZEE

In *Science* for January 10, 1930, Professor J. G. Needham, in an article on "Scientific Names," makes a plea for simplifying zoölogical nomenclature, suggesting a return to simple binomials with fewer and larger genera. The "larger genera" would appeal strongly to many and is right in line with a suggestion made by me in the April, 1926 number of the PAN-PACIFIC ENTOMOLOGIST (p. 215), that in ordinary use we ignore the finer subdivisions of both genera and species leaving such subdivisions for the taxonomist, to be used as subgenera, subspecies, or varieties if he so elect. Professor Needham hits the nail squarely on the head when he says that the number of generic names does concern the general worker [in entomology] "for if he has to learn a new genus name for almost every species that name is no aid at all, but an added burden on his memory."

We would most heartily endorse Professor Needham's plea for the more comprehensive genera, using their subdivision as subgenera. Such subdivisions are of great value to the systematist, but of little or no interest to the economic entomologist.

The matter of trinomials and quadrinomials has recently (*Science,* February 21, 1930, p. 217), been discussed by Professor Cockerell in a very clear and satisfactory way. It is hard to see how we could indicate the evolution of our species without these minuter subdivisions. Professor Needham's method of using the names of the more important of these subdivisions as species names would be particularly unfortunate with the recent tendency to arrange species names alphabetically in our catalogues, where all indications of relationship are lost. Most entomological systematists confine their studies to some one group of insects, and if they use these names of the minor divisions of genera and species in their proper logical categories this multiplicity of names will, up to a reasonable point, be a help to him by indicating the relationship and development of the species. The economic entomologist again can ignore these minor divisions. He can, for instance, use the name *Pieris napi* for all forms of that species, ignoring the subspecies, seasonal forms and aberrations.

THE LARVA OF CYLINDROCOPTURUS CRASSUS VAN DYKE

BY H. H. KEIFER
Sacramento, California

Since this weevil is a pest in flower gardens and is most likely to be noted as such in the larval state, it seems advisable to attempt a partial description in connection with that of the adult to aid in future determination. These notes on the external morphology are not intended to be complete but are a series of remarks and figures to give the larva a taxonomic status.

Infested chrysanthemum plants were sent to the Department of Agriculture at Sacramento on August 8, 1929, from some locality in San Mateo County by A. W. Tate, Jr. It was immediately noted that several small weevil larvæ in each stalk had girdled the plant just under the bark at or immediately below the ground line. On examining these stalks in the latter part of November 1929, it appeared that the larvæ had formed small cells under the outer integument of the stem, pupated, and transformed to adults.

The larva (Fig. 1) of this species will tentatively run to the *Cylindrocopturini* in Boving's key (see ref.) The spiracles are as stated, but there is no posterior conical projection from the ninth tergum of the abdomen. There is, however, a small eyelike spot on each side of the head which is apparently within the head capsule, but does not correspond to the eyelike spot referred to in the above-mentioned key.

This *Cylindrocopturus* larva is approximately 5 mm. long. Its general shape is cylindrical, cyrtosomatic, tapering very little. The color is white and the hairs are not apparent, even under a binocular microscope, with the exception of a few posterior dorsal setæ. The position of these setæ could only be determined from stained mounts.

The head is light yellowish brown, elongate oval, four-fifths as wide as long, at least half retracted into the prothorax. Conspicuous whitish areas appear above: on the posterior half of the frons (Fig. 2, *f*); a rather wide longitudinal area near and parallel to the epicranial suture on each side. The frons is a little over half as long as the epicranial suture; it is longer than wide and ends posteriorly in an acute angle. The frontal carina (Fig. 1, *car*) is very distinct, about one-third the length of the frons. The frons has five setæ and two sensory spots on each side. The epicranium (Fig. 1, *ep*) and

frons are at all places distinct. The epicranial setæ are crowded forward due to the position of the prothorax; apparently nine anterior setæ, five sensory spots (one back within the prothorax), and four posterior minute setæ on each side of the head. The antennal lobe (Fig. 2, *b*) is small and located near the mandible at the suture separating the frons from the epicranium; the second segment is very reduced, anteriorly placed on the first segment; five sensory papillæ are posteriorly placed on the first segment. The ocellus (Fig. 2, *o*) is just posterior to the antenna and not pigmented. The mandibles are not large or prominent, have no definite teeth, but a rather wide grinding surface, and two small setæ. The maxillary mala (Fig. 2, *a*) tends to be flattened apically and has eleven stout setæ, the inner seven or eight bladelike. The epipharyngeal rods are subparallel and narrow, broadly joined posteriorly.

The body integument is generally covered with posteriorly projecting spinules. These spinules vary in size and number according to location. On the body in general they are comparatively small and arranged in almost scattered rows (Fig 1, *d*). Notable exceptions to this are found on the prothorax and the last few abdominal sterna. On the prothorax a transverse band crosses the posterior part of the tergum (Fig. 1, *b*), where these small spines are crowded and large; more or less dense areas also recur on the pleura and the sternum of this segment. On the abdomen this condition also occurs on the last three abdominal sterna (Fig. 1, *g*).

The areas of the body are not very different from the majority of described weevil larvæ in regard to the number and position of the setæ. The prothoracic shield (Fig. 1, *psh*) is rather large, with ten conspicuous setæ on each side of the tergum. The terga of the other two thoracic segments are divided into the prescutum (Fig. 1, *prs*) and scuto-scutellum (*scl*), with one and four setæ respectively on each side. The alar area of each of these last two segments has one seta which is directly below and in line with the scuto-scutellar setæ. On the thoracic epipleura (Fig. 1, *epi, pre*) the prothorax shows no setæ; the mesothorax has two on the preepipleurum (*pre*) and two are on the metathorax. The hypopleurum of the prothorax has two setæ, with one each on the corresponding area of the other two segments (Fig. 1, *hyp*). The coxal lobes (*cx*) are inclined to be prominent and have six setæ. There is one seta on each side of the thoracic eusterna (*eus*).

Of the abdomen the first seven segments are alike. The tergum of each shows four areas; the prescutum (*prs*) with one seta on each side, the scutum (*sc*), the scutellum (*scl*) with five setæ, and the postscutellum (small and lateral) not attaining the dorsum (*pscl*). Two alar setæ are just above each spiracle. The epipleura (*epi*) and hypopleura (*hyp*) are rather elongate, each of one lobe; they are separated by a very distinct ventrolateral suture and have two setæ

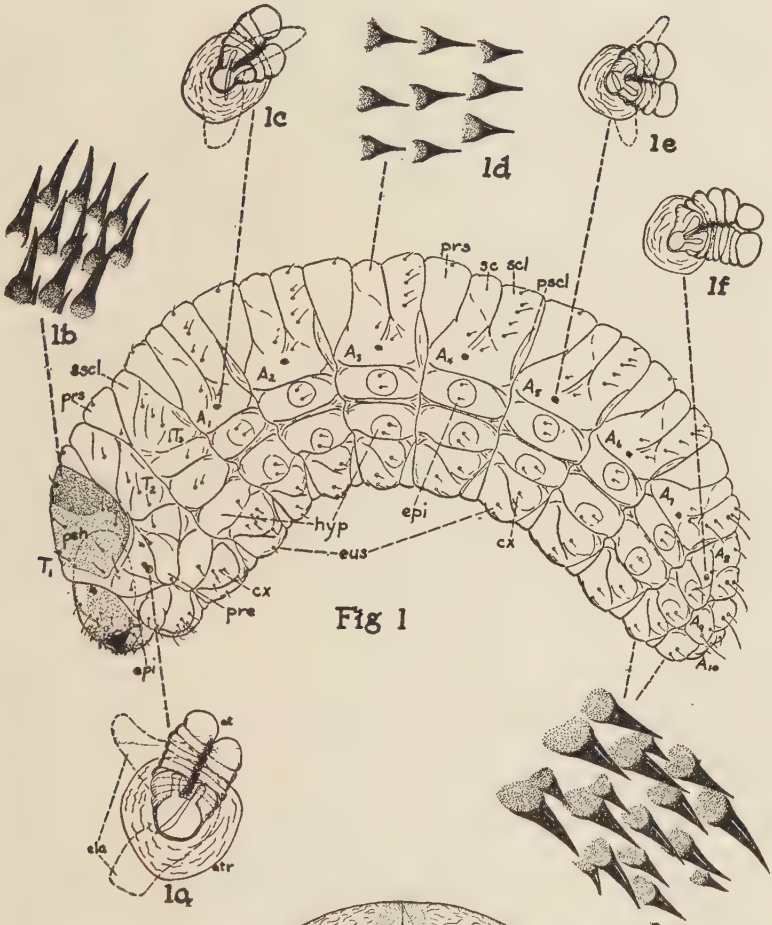
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Fig 1

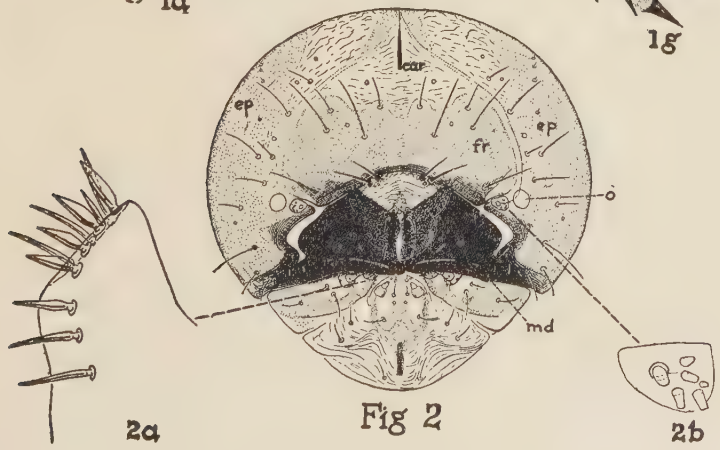
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Fig 2

each. The parasterna (*cx*) have one seta each. The eusterna (*eus*) have a pair of setæ on each side. A poststernellum is indicated on each segment. The eighth segment (A_8) is like the preceding except that it has but two tergal areas, and one and three setæ on each lobe, respectively. The ninth (A_9) is still further reduced, with two dorsal, two lateral, and two ventral setæ on one side. The tenth (A_{10}) is very reduced, with two setæ on each side.

The spiracles (Fig. 1, *a*; 1, *c*; 1, *e*; 1, *f*) are bifore, the air tubes extending well beyond the atrium (Fig. 1, *a, atr*). The air tubes (*at*) are annulate, with the anterior (or dorsal) tube usually longer and somewhat curved onto the other. The mesothoracic spiracle (Fig. 1, *a*) is largest, the air tubes (*at*) point dorsally and somewhat posteriorly, the anterior tube has six or seven annulæ, the posterior tube with four or five. The abdominal spiracles are generally smaller. The first (Fig. 1, *c*) is inclined more posteriorly than the mesothoracic, with four or five annulæ on the anterior tube and three or four on the posterior. The fifth (Fig. 1, *e*) points directly posteriorly (horizontal to the body) with about the same number of annulæ on each tube. The eighth (Fig. 1, *f*) is somewhat larger than the average and has about as many annulæ as the mesothoracic spiracle, with more on the ventral tube.

Reference

Boving, A. E.: Immature Stages of *Eumycterus* (?) *saccharidis* Barber, with comments on the classification of the tribe Barini (Coleoptera; Curculionidæ), Proc. Ent. Soc. Wash., Vol. 29, p. 151, 1927.

The Plate

Figure 1—Larvæ of *Cylindrocopturus crassus* Van Dyke; A_1 to A_{10} abdominal segments; *cx,* coxal or parasternal lobes; *epi,* epipleurum; *eus,* eusternum; *hyp,* hypopleurum; *pre,* preëpipleurum; *prs,* prescutum; *pscl,* postscutellum; *pah,* prothoracic shield; *sc,* scutum; *scl,* scutellum; *sscl,* scuto-scutellum; T_1, T_2, T_3, thoracic segments.

Figure 1, *a*—Mesothoracic spiracle; *at,* air tubes; *atr,* atrium; *cla,* closing apparatus. Figure 1, *b*—Spinules of prothoracic tergum. Figure 1, *c*—First abdominal spiracle. Figure 1, *d*—Spinules as found on the body in general. Figure 1, *e*—Fifth abdominal spiracle. Figure 1, *f*—Eighth abdominal spiracle. Figure 1, *g*—Spinules as on the last two or three abdominal sterna.

Figure 2—Anterior view of head; *car,* median frontal carina; *ep,* epicranium; *fr,* frons; *md,* mandible; *o,* ocellus. Figure 2, *a*—Ental view of right maxillary mala. Figure 2, *b*—Antenna: the first segment is the basal part, the second segment is to the left, the sensory papillæ are on the right.

REVISION OF THE GENUS AND SPECIES OF DINACOMA WITH DESCRIPTION OF A NEW SPECIES (COLEOPTERA: SCARABÆIDÆ)

BY FRANK E. BLAISDELL, SR.
Stanford Medical School, San Francisco, California

In 1885 Thomas L. Casey announced a new scarabæid, *Polyphylla marginata*, without description. In 1886 the description of the species appeared under the generic caption of *Thyce marginata*. In 1889 a new genus was established for the species by Casey, namely, *Dinacoma*. According to him the characters agreeing with *Thyce* are the structure of the labial palpi and tarsal claws, and those agreeing with *Polyphylla* are the greatly developed male antennal club and the "short" tarsi. On account of the disconnected publication of the original descriptions the following revision is presented. Colonel Casey's generic characterization follows with slight modification:

Dinacoma Casey (Melolonthini)

Clypeus concave, parallel and subtruncate at apex; mentum moderate, concave, subquadrate and connate with the ligula; the latter transverse and feebly emarginate at apex. Maxillæ moderate, the palpi well developed; first joint very small, narrow and obconical; second and third longer than wide, the former the longer, both obconical and obliquely truncate; fourth slightly shorter than the preceding three together, pointed, deeply impressed or excavated on its outer face. Labial palpi very small; third joint ovoidal, obtusely acuminate, as long as the two preceding together. Labrum short, transverse, free, impressed in the middle. Antennæ ten-jointed; middle joints of funicle subankylosed, short; club trifoliate, very long and arcuate in the males. Anterior coxæ transverse, but slightly prominent. Metasternal episterna moderate in width. Abdominal segments connate, the sutures fine but not entirely obliterated, rendered distinct by the disposition of the vestiture. Metasternum well developed. Legs rather short and slender; tarsi moderate in length, the posterior shorter than the tibiæ; claws moderately evenly and strongly arcuate, toothed near the base, the teeth distinctly unequal, especially the anterior.

In both of the known species the anterior tibiæ have two teeth exclusive of the exterior and very pronounced apical spur; these teeth are very unequal, the one nearer the base being very short and obtuse.

Dinacoma marginata Casey

Form moderately robust to somewhat parallel; sides more or less distinctly arcuate, least so in the parallel form. Color rufo-fuscous, the anterior parts somewhat piceous, legs fuscous. Head, pronotum and femora abundantly clothed with long flying hairs, less abundant on the abdomen and sparser and shorter on the tibiæ; sterna extremely densely clothed with long, soft, cinereo-fuscous pile. Squamous vestiture albo-plumbeous. Pronotum with three posteriorly divergent vittæ of cinereous squamæ, the exterior ones widest and interrupted in the middle, the median finer and more or less obsolete, especially toward the base. Each elytron having along the exterior edge a very wide line of plumbeo-cinereous and slender squamæ not very closely placed, which is incurved at apex, continuing thence along the suture as a narrow, whiter and usually better defined line to the base; between these another very fine vitta, terminating at about one-fifth of the length from the apex; squamæ of the intervening areas slender and sparser, while those of the vittæ and those otherwise distributed are stouter, all lanceolate and linearly acuminate apically, to linear or even hairlike. On the pronotum the visible surface between the vittæ is very sparsely punctate; punctures coarse, circular, variolate and shallow, each giving rise to a squama or a long, more or less erect, hair. Scutellum very densely clothed with cinereous squamæ. Beneath the inflexed sides of the pronotum and mesosternal and metasternal parapleuræ in part are densely clothed with albo-cinereous squamæ, each ventral segment has an irregular spot of similar character each side next to the epipleuræ; abdominal surface sparsely clothed with smaller lanceolate squamæ. Head rather densely clothed with long flying hairs, intermixed with moderately narrow lanceolate squamæ at periphery, especially on the clypeus, these more or less obsolete centrally and replaced by hairs; beneath, the hairs are more abundant and longer.

Head, excluding the eyes, slightly longer than wide, subquadrate; clypeus moderately reflexed, apex broadly and feebly sinuate, angles rectangular; frons densely and coarsely punctate, clypeus less so. Antennæ well developed, club three and a half times longer than wide and two and a fifth times longer than the funicle; the folia wider at apex than at base. Funicular joints nearly equal in length, the fifth and sixth with club in adduction appear transverse and briefly produced anteriorly; with club in abduction they appear longer and subequal to each of the other joints (Fig 9); scape obconical, short, and less than twice as long as wide at apex.

Pronotum widest at middle and there moderately arcuate, about one-half wider than long; sides thence strongly convergent and feebly arcuate to the apical angles which are very obtuse, toward base feebly convergent and straight to the basal angles, the latter obtuse and more or less rounded; base strongly arcuate, especially

in middle third, and feebly sinuate laterally toward each angle; disk strongly convex from side to side, sparsely and irregularly punctate, punctures shallow, variolate and circular, smaller and denser in the densely squamous areas.

Elytra at base slightly wider than the prothorax, sides parallel and more or less arcuate, together slightly less than one-half longer than wide, two and a half times as long as the pronotum, finely, sparsely, feebly and irregularly punctate, punctures somewhat asperate; apices separately rounded, sutural angles obtuse.

Pygidium slightly wider than long, feebly convex, finely and rather sparsely punctate, moderately sparsely and evenly clothed with small, slender squamæ and intermixed hairs. Posterior tarsi three-fourths as long as the tibiæ. Claws moderate, having a small erect tooth interiorly near the base; tooth of outer anterior claw small or obsolete with inferior margin thence to base more or less sinuate; inner teeth of the middle and posterior claws a little smaller than the outer.

Males with a large and rather feeble, more or less variable impression in the middle of the abdomen near the base. Female unknown.

Holotype, a male, in the Casey collection deposited in the United States National Museum. Length, 19 mm.; width, 8.5 mm.

Type locality: San Diego County, California, undoubtedly Ocean Beach near San Diego. Casey mentions five or six specimens taken by Mr. G. W. Dunn and that he received the type specimen from Mr. W. G. W. Harford. Six specimens studied as follows: Three in the Van Dyke collection, two taken by E. L. Ricksecker at Ocean Beach, and one collected at Riverside, California, July, 1914; one presented to the collection of the California Academy of Sciences by Dr. F. C. Clark, also taken at Ocean Beach; and two in the author's collection, taken by George Field at Ocean Beach on June 28, 1897. A specimen has been submitted to Mr. L. L. Buchanan, custodian of the Casey collection in the National Museum, who has very carefully compared it with the type and vouches for the correctness of the identification.

The specimen from Riverside presents some divergence from the typical *marginata*: the clypeus is moderately deeply and triangularly emarginate and the elytra are not noticeably vittate; the abdomen is more densely squamous and the lateral white spots not defined. Two other specimens taken at San

Diego by Mr. Field present other divergencies. These specimens may represent other species or subspecies.

In *marginata* the apical deflexed surface of the clypeus is glabrous and shining, with a row of slightly irregularly placed punctures at base near the labrum, each puncture well defined, coarse, shallow, and setigerous. The labrum is deeply and broadly emarginate, the rounded floor of the sinus is flush with the deflexed surface of the clypeus, the lateral lobes are small and obtusely rounded on the apical margin and not beaded.

Dinacoma caseyi Blaisdell, new species

Form moderately robust to somewhat parallel, in the former the sides are distinctly arcuate, less so in the parallel form. Moderately rufous in color. Squamous vestiture and pubescence albo-cinereous throughout. Head, pronotum, and legs rather sparsely clothed with long, soft, flying hairs, abdominal segments less so; sterna extremely densely invested with long, soft pile; anterior margin of the femora fimbriate with similar hairs. Head, pronotum and pygidium densely squamous, more or less hiding the general surface, sparser on the femora and tibiæ; squamæ extremely dense on the scutellum and undersurface of the body, especially on the abdominal segments. Pronotum with a more or less broad lateral vitta (usually attaining the margin) of densely placed squamæ, and a narrow median more or less evident vitta. Each elytron not densely squamous, a subsutural narrow vitta is most noticeable, lateral vittæ obsolete, a narrow median vitta is sometimes almost evident, always evanescent apically. Squamæ lanceolate and less elongate than in *marginata,* much less acuminate at apex.

Head excluding the eyes scarcely longer than wide, quite quadrate; clypeus rather less than moderately reflexed, apex truncate and feebly sinuate, angles rectangular, sides distinctly parallel; coarsely punctate, punctures circular, shallow and variolate, hidden by the bases of the squamæ when not desquamated, exposed piliferous punctures much fewer than in *marginata.* Apical deflexed surface of the clypeus glabrous, with a transverse line of coarse subobsolete setigerous punctures at middle; labrum deeply emarginate and impressed at middle and flush with the clypeal surface, lobes small and more or less beaded at apex. Antennæ well developed, club three and a half times longer than wide and two and a seventh times longer than the funicle, folia narrowed in about basal fourth and therefore widest at apex, the latter evenly rounded; funicle rather stout, second joint a little longer than the third, the latter and others quite equal in length when the club is abducted (Fig. 9); the last two funicular joints appear transverse and slightly produced anteriorly and flattened, when the club is adducted.

Pronotum widest at middle, where the sides are rather strongly arcuate and at that point a half wider than long, thence strongly convergent and slightly arcuate to the obtusely rounded apical angles, feebly convergent and almost straight to the moderately rounded basal angles; apex transverse in circular arc; base arcuate, feebly subangulate at middle, thence feebly sinuate laterally toward each angle; disk quite strongly convex from side to side, densely punctate, punctures circular, coarse, shallow and variolate when visible, base of each squama neatly fitted to the contour of the puncture, piliferous punctures not conspicuous and fewer in number than in *marginata*; lateral margins very loosely fimbriate with very long, recurving hairs.

Elytra at base slightly wider than the prothorax, sides parallel and more or less arcuate, together about a third longer than wide and about two and a half times as long as the pronotum; finely, not densely, feebly and irregularly punctate, punctures not noticeably asperulate; apices feebly subtruncate, each slightly inwardly oblique toward the obtuse sutural angle.

Pygidium about a fourth wider than long, convex, finely and rather densely punctate. Posterior tarsi a fifth of their length shorter than the tibia. Claws toothed near the base, teeth well developed, tooth of outer anterior claw small or obsolescent, the inner of the middle and hind tarsi slightly smaller than the outer.

Males with the abdominal segments slightly flattened or impressed along the middle. Female unknown.

Holotype, in my collection, a male (No. 2650, Mus. Calif. Acad. Sci.). Length, 19 mm.; width, 8 mm.

Type locality: **Palm Springs, Imperial County, California;** collected on May 10, 1923. Six specimens studied, five being paratypes, one to be deposited in the collection of the United States National Museum.

Distribution: Southeastern California. Taken at Palm Springs by Mr. J. O. Martin on June 8, 1916; and in Riverside County on April 17 by Mr. E. R. Leach. Specimens have also been examined in the collection of James E. Cottle that were taken in the vicinity of Palm Springs.

Caseyi differs in many characters from *marginata*—the rufous color, obsolete elytral vittæ, and the snowy white squamous vestiture that is extremely dense on the abdominal segments. In *marginata* the squamous vestiture is sparser, especially on the abdomen, the elytra distinctly vittate, and the color is more fuscous than rufous. *Marginata* is Polyphylla-

like in facies, while *caseyi* is more Thyce-like, except for the antennal club.

The male genitalia of *marginata* is figured below and compared with that of a male *Polyphylla 10-lineata*. The differences are very evident. In *marginata* the claspers have a tooth or hook on the inferior margin near apex, while in *Polyphylla* the claspers are decurved and incurved at apex.

In the species of *Dinacoma* the following device for maintaining the eyes free from foreign materials which obscure the vision may be described as follows: The eyes are deeply emarginated by a digitiform extension of the lateral frontal margin; the surface of the process is coarsely punctate. From the punctures arise moderately long and erect, rather rigid setiform hairs. The posterior surface of the first antennal joint or scape is quite densely fimbriate with unusually long apically curved hairs, which, when the antennæ are moved backward and forward, sweep the anterior part of the eyes and, in the backward movement, interdigitate with the erect hairs of the emarginating process which act as a comb, freeing the antennal fimbriæ from dirt. The posterior portion of each eye is swept by the postocular apical pronotal fimbriæ when the head is extended or retracted; also when the head is moved from side to side. The device is better developed in *marginata* than in *caseyi*. It is poorly developed in *Polyphylla*.

All comparative measurements have been made from camera lucida tracings. The measurements given above differ considerably from those given by Colonel Casey. In such scarabæids as *Polyphylla* and *Dinacoma* with large antennal clubs, the club should be abducted at right angles to the long axis of the funicle, which is straightened thereby, before making the comparative measurements; when the club is adducted the fifth and sixth funicular joints appear much abbreviated. Casey states that the tarsi are short; by direct measurement a posterior tarsus is found to be one-fifth of their own length shorter than the tibia. The author, therefore, states that the tarsi are moderate in length.

Synoptic Statement

Elytra vittate; color rufo-fuscous to more or less piceous; squamous vestiture not extremely dense on sterna and abdomen; squamæ

linearly acuminate at apex.....*marginata* Casey
Elytra not vittate; color rufous; squamous vestiture extremely dense on sterna and abdomen, albo-cinereous in color; squamæ acutely acuminate at apex.....*caseyi,* new species

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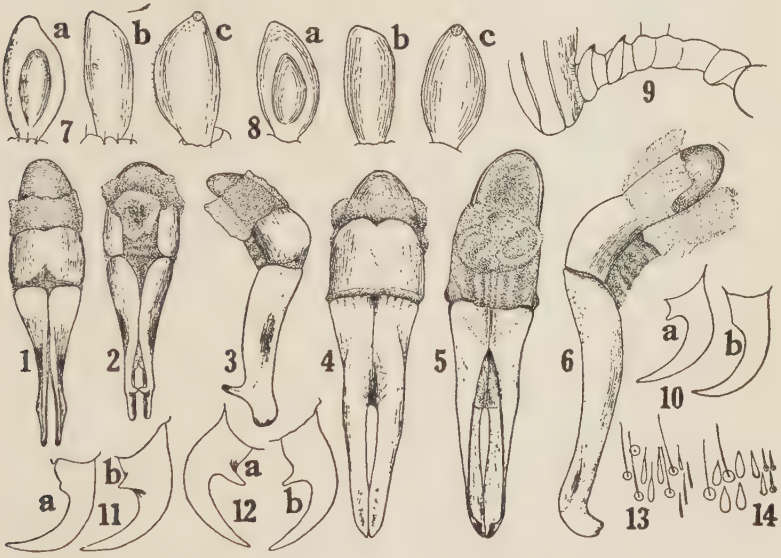

1, male genitalia of *Dinacoma* marginata, dorsal view; 2, ditto, ventral view; 3, ditto, lateral view; 4, male genitalia of *Polyphylla 10-lineata,* dorsal view; 5, ditto, ventral view; 6, ditto, lateral view. 7, terminal joint of maxillary palpus of *marginata*: (a) outer surface, (b) upper surface, (c) inner surface. 8, ditto of *Dinacoma caseyi*: (a) outer surface, (b) upper surface, (c) inner surface. 9, antennal funicle of *caseyi,* club abducted at right angles to long axis of funicle, condyles of fifth and sixth joints showing; with club in adduction the fifth and sixth joints are transverse, condyles not visible. 10, anterior tarsal claws of *caseyi*: (a) inner, (b) outer. 11, anterior claws of *marginata*: (a) outer, (b) inner. 12, posterior left tarsal claws: (a) outer, (b) inner. 13, predominating squamæ of *marginata.* 14, predominating squamæ of *caseyi.*

TERMITES COLLECTED BY T. T. CRAIG ON SOCORRO ISLAND

BY S. F. LIGHT
Department of Zoölogy, University of California

In a recent note in this journal (1929) on the distribution of termites in Lower California, I pointed out that the six species known from that region are found also in California or Arizona. Through the kindness of Mr. T. T. Craig I have received for study three species of termites, collected by him in March 1928 on Socorro Island. Socorro Island lies in 18 degrees 45 minutes north latitude and 111 degrees west longitude, approximately three hundred miles nearly due south of the southern extremity of Lower California and some four hundred miles west of the coast of Mexico proper. While one of the species in this collection, *Kalotermes hubbardi* Banks, is found in Lower California, the other two seem to indicate a closer relation of the Socorro Island fauna to that of the mainland of Mexico. Small as this collection is, it furnishes very important information and provides another example of the extremely interesting finds awaiting the collector and student of termites in the Mexican region.

To insure correctness of identification in a region outside my previous experience, I sent the collection to Dr. T. E. Snyder of the United States Bureau of Entomology, well known authority on termites of the Americas, who confirmed my identification of the species represented as follows: *Kalotermes hubbardi* Banks; *Kalotermes jouteli* Banks; *Cryptotermes* sp. (a single dealate).

Mr. Craig's collections were made from mangrove logs in a dry wash near Braithwaite Bay, Socorro Island. His description (in lit.) of the vegetation of the island is of interest:

"The island—at least what I saw of it in my two hundred and five hours—is covered with a dense growth of brush, similar to the chapparal here at home, but about half again as high and many times more dense, unbelievably dense. It was, therefore, almost impossible to make any headway except by crawling in, under, and about the low mangrove trees that grow in the washes, very dry when I was there."

KALOTERMES HUBBARDI Banks

This record extends the range of *Kalotermes hubbardi* two hundred and fifty miles to the south of Cape San Lucas, where it was reported by Banks and Snyder (1920, Bulletin 108, United States National Museum) and in my recent note.

The present collection consists of a number of soldiers and nymphs. The soldiers are smaller than those commonly encountered, and certain other differences are apparent. Most striking of these are the greater length of the third antennal segment and the pronotum. These differences are brought out by the measurements and indices given below. Whether they represent anything more than the variation normal to the species can only be determined when more material is available for study.

Differences in size and proportion between a soldier of *Kalotermes hubbardi* Banks from Socorro Island, Mexico, and one from Phoenix, Arizona. Measurements in millimeters.

Measurement or Index	Socorro Island Specimen	Phoenix Specimen
Head width	1.61	1.76
Head length	1.83	2.10
Head index (head width divided by head length)	0.88	0.83
Mandible length	1.39	1.47
Mandible-head index (mandible length by head length)	0.76	0.69
Length of third antennal segment	0.62	0.57
Third antennal segment index (length of segment by head length)	0.35	0.27
Pronotum width	1.32	1.61
Minimum pronotum length	0.62	0.775
Maximum pronotum length	0.93	1.008
Pronotal index (maximum length by width)	0.56	0.626

KALOTERMES JOUTELI Banks

This large and interesting species was previously known only from the east coast of Mexico, southeastern Florida, and Cuba. Mr. Craig's collection of a single soldier on Socorro Island gives it a remarkable east and west range of some 1400 miles and makes it probable that it will be found throughout much of Mexico.

CRYPTOTERMES sp.

It seems unwise to attempt a specific identification of the single dealate *Cryptotermes* individual. It is particularly interesting, however, as representing the first record for the genus in western North America. Indeed the only record west of the eastern coast of Florida is that of a single specimen taken at Cotulla, Texas, which Banks has described (1920) as *Cryptotermes infumatus.*

NOTES ON TRICHOGRAMMA MINUTUM

BY STANLEY E. FLANDERS
Citrus Experiment Station, Riverside, California

When newly deposited eggs of the orange Tortrix were parasitized by *Trichogramma* and placed in an incubator at about 80 degrees Fahrenheit, the adult parasites emerged eight to nine days later. The larvæ from unparasitized eggs emerged at the same time.

One female *Trichogramma* oviposited eight times within fifteen minutes. Less than seven hours later the movement of newly hatched *Trichogramma* larvæ could be observed within the eggs. Twenty-four hours after oviposition some of the larvæ measured .32 of a millimeter in length and .13 of a millimeter in width. About forty-eight hours after hatching, the larvæ were full grown. The appendages of the larva consist only of a pair of slender, curved mandibles, which are apparently functionless.

After the larva has ingested all of the contents of the host egg, it apparently voids liquid fecal matter which spreads in a thin film over the inner surface of the host egg shell, drying into white crystal-like particles. This excrement, as well as the egg shell, usually turns black just prior to the pupation of the parasites. The cause of this common phenomenon is not known.

If *Trichogramma* oviposits in an egg after the embryo is about three-fifths developed, the embryo is destroyed but the parasite rarely completes its development.

The parasite just before its emergence from the egg is positively phototropic since it cuts an exit hole on the side exposed to the strongest light.

Trichogramma obtained from different localities may exhibit marked differences in fecundity and in the retention of pigmentation when reared under the same environmental conditions. Females from Yucaipa, California, a hot, dry interior section, lose their pigmentation when reared at room temperatures. Those from Saticoy, a cool, humid section, lose their pigmentation at higher temperatures, while a strain from El Dorado, Mexico, a hot, humid region, retains its pigmentation at all temperatures. In each case the density of pigmentation decreases with the rising temperature.

The difference in the fecundity of the females of these different strains when placed with *Sitotroga* eggs varied likewise, being decidedly low for the Yucaipa strain and very high for the Mexican strain.

The Yucaipa and Saticoy strains interbreed readily. All attempts of the writer to cross these strains with the Mexican have been unsuccessful. Copulation occurs, but the progeny are all males.

When the eggs of *Ephestia cautella* are parasitized and then held submerged in water for a week at 85 degrees Fahrenheit, the parasites develop normally up to the late pupal period and then die. It thus appears that the oxygen requirements of *Trichogramma* prior to the late pupal period are quite low.

Phlœosinus Kills Trees

There has been some question whether or not the cypress bark beetle, *Phlœosinus cristatus* Lec., could kill a healthy tree. Whether it will attack a vigorous growing tree has not been determined, but very few trees are in full vigor all their lives. Sooner or later a few unfavorable years slow up the growth and place them below par in health. The writer has observed several trees that were attacked from fifteen to twenty years ago and one side of the main trunk was killed. Since then the trees recovered, became vigorous enough to lay on five inches of wood over the edges of the wounds, and at present are alive and vigorous. Others survived the first attack and recovered. but were killed by later attacks.—H. E. Burke.

NOTES ON UTAH SYRPHIDÆ [1]

BY G. F. KNOWLTON AND H. J. PACK [2]

In connection with a study of the aphids occurring in the state, work toward a list of the syrphids of Utah was commenced in 1923. Mr. David G. Hall accompanied the senior author in a collecting trip over much of Utah during the summer of 1925; during this time a number of syrphids were collected. The writers are indebted to Mr. Hall for a list of Utah syrphids collected by himself and for the determination of much of the material in the Utah Agricultural Experiment Station collection. Dr. Vasco M. Tanner very kindly consented to our use of data from specimens in the collection of the Entomology Department at the Brigham Young University. The writers are also indebted to Messrs. C. H. Curran, C. T. Greene, and C. R. Jones for the determination of much of the material recorded in this list.

Family *Syrphidæ*

1. Chrysotoxum derivatum Walker

Dividend (Spalding [3]); Logan, June 1925 (Hall and Knowlton). Also collected at Black Sands Basin, Yellowstone National Park, Wyoming (Tanner).

2. Chrysotoxum integrum Williston

Aspen Grove, Timpanogos, July 1926 (Tanner); La Sal Mountains, June 1927 (Tanner); Logan Canyon, June 1923 (Knowlton); Raft River Mountains, June 1928 (Beck); Parowan, August 1929 (Tanner). Also collected at Lava Hot Springs, Idaho (Beck).

3. Chrysotoxum ypsilon Williston

Aspen Grove, B. Y. U. Campus, Timpanogos, July 1927 (Tanner).

4. Chrysogaster bellula Williston

Spring Hollow in Logan Canyon, August 28, 1925 (Knowlton).

5. Chrysogaster parva Shannon

Logan, May 2, 1923 (Knowlton); Logan Canyon, July 1925 (Hall).

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1 Contribution from the Department of Entomology, Utah Agricultural Experiment Station.

2 Died January 5, 1930.

3 Unless otherwise indicated, localities listed are in Utah. Publication authorized by director February 28, 1930.

6. PIPIZA CALIFORNICA Davidson

St. George, July 1925 (Hall).

7. PARAGUS BICOLOR Fabricius

Logan, May 17, 1929 (Knowlton); St. George, July 1925 (Hall).

8. PARAGUS TIBIALIS Fallén

Portage, August 20, 1926 (Knowlton); Sheep Creek, Duchesne County, June 1926 (Tanner); Willard, September 10, 1925 (Knowlton). Also collected at Mesa Verde National Park, Colorado, June 1927 (Tanner).

9. PARAGUS ANGUSTIFRONS Loew

Riverdale, September 14, 1925 (Knowlton).

10. CHILOSIA OCCIDENTALIS Williston

City Creek Canyon, June 1925 (Hall and Knowlton).

11. BACCHA LEMUR Osten Sacken

Cedar Breaks, June 1925 (Hall and Knowlton); Duchesne, July 1926 (Tanner); Dividend, July 17 (Spalding); Indianola, June 1929 (Tanner).

12. PYROPHÆNA OCYMI Fabricius

Cedar City, July 1925 (Hall).

13. PYROPHÆNA GRANDITARSUS Forster

Brigham City, September 10, 1925 (Knowlton); Corinne, September 9, 1925 (Knowlton).

14. PLATYCHIRUS QUADRATUS Say

Logan Canyon, July 1925 (Hall).

15. MELANOSTOMA CŒRULESCENS Williston

Miner's Peak, July 11, 1919; Tony Grove Park in Logan Canyon, July 1925 (Hall).

16. MELANOSTOMA CONCINNUM Snow

Tony Grove Park in Logan Canyon, August 1925 (Hall).

17. MELANOSTOMA MELLINUM Linnæus

Lewiston, 1925 (Knowlton).

18. MELANOSTOMA STEGNUM Say

Logan, May 19, 1924 (Knowlton).

19. MELANOSTOMA TIGRINUM Williston

Logan, June 1925 (Hall).

20. Melanostoma obscurum Williston

Brigham City, September 1928 (Knowlton); Logan, June 1925 (Hall); Miner's Peak, June 11, 1919; St. George, July 1925 (Hall); Wellsville.

21. Eupeodes braggi Jones

Madison River, Yellowstone National Park, Wyoming, July 1929 (Beck).

22. Eupeodes volucris Osten Sacken

Aspen Grove, Timpanogos, August 1926 (Tanner); Bear River Bay, July 7, 1925 (Hall); Bear River City, July 1929 (Knowlton); Bluff (Rasmussen); Bountiful (Knowlton); Brigham City, September 2, 1927 (Knowlton); Cedar City, July 22, 1926 (Knowlton); Coal Creek, Deep Creek Mountains, June 1928 (Tanner); Dividend (Spalding); Glacier Lake, Timpanogos (Tanner); Indianola, June 1929 (Tanner); Logan, July 14, 1923 (Knowlton); Logan Canyon, June 24, 1925 (Hall); Moab (Call); Parowan, August 1929 (Tanner); on beets at Pleasant View, June 1928 (Knowlton); Provo (Brown and Curtis); Portage, July 20, 1927 (Knowlton); Salt Lake City, July 28, 1923 (Knowlton); Torry, June 26, 1926 (Knowlton and Titus); Wellsville Canyon, June 1926 (Brown); Widtsoe, August 1929 (Tanner); Zion National Park (Tanner and Bentley). Also collected at Kaibab Forest, Arizona, July 1927 (Call); Rim of Grand Canyon, Kaibab Forest, Arizona, 1927 (Tanner); Mesa Verde National Park, Colorado, June 1927 (Tanner); Lewis Lake, Yellowstone National Park, Wyoming, July 1929 (Tanner).

23. Lasiophthicus pyrastri (Linnæus)

Aspen Grove, Timpanogos, July 1926 (Tanner); Bluff, July 1927 (Call); Logan, May 19, 1924 (Knowlton); La Sal Mountains, Mount Tuhuhnikivats (Tanner); Miner's Peak, July 12, 1919; Indianola (Tanner); Murray, July 3, 1908; Provo (Tanner); Raft River Mountains, June 1928 (Tanner); Salt Lake City, June 16, 1929 (Tanner); Wellsville Canyon, June 1926 (Cottam); Zion National Park (Liddle). Also collected at Fort Bridger, Wyoming, June 1926 (Brown); Herford Ranger Station, Idaho (Tanner).

24. Syrphus americanus Wiedemann

Aspen Grove, B. Y. U. Campus, Timpanogos, July 1927 (Tanner); City Creek Canyon, June 1925 (Hall and Knowlton); Deep Creek Mountains, June 1928 (Tanner); Miner's Peak, June 11, 1919; Pine Valley (Liddle); St. George, May 26, 1919; Zion National Park, 1926 (Knowlton).

25. Syrphus arcuatus (Fallén)

Logan, July 1924 (Knowlton); Logan Canyon, June 1923 (Knowlton); Plain City, June 7, 1929 (Knowlton); Provo (Rowe); Wells-

ville Canyon, June 1926 (Tanner). Also collected at Mink Creek, Immigration Canyon, Idaho (Hall and Knowlton); Fort Bridger, Wyoming, June 1926 (Tanner); Lake Hotel, Yellowstone National Park, Wyoming, July 1929 (Tanner).

26. Syrphus opinator Osten Sacken

Aspen Grove, B. Y. U. Campus, Timpanogos, July 1925 (Tanner); Bryce Canyon National Park, August 1929 (Tanner); numerous at Bountiful, May 8, 1929 (Knowlton); Central, June 1922 (Tanner); Far West, June 1926 (Hayward); Logan, June 6, 1922 (Knowlton), and April 18, 1915 (L. Davidson); Provo (Thomas); Raft River Mountains, June 1928 (Beck); Riverside, June 1926 (Hayward); Wellsville Canyon, June 1926 (Tanner). Also collected at Rim, Grand Canyon, Kaibab Forest, Arizona, July 1927 (Tanner); Kaibab Forest, Arizona, July 1927 (Call).

27. Syrphus perplexus Osburn

Numerous at Bountiful, May 8, 1929 (Knowlton); Woods Cross, May 8, 1929 (Knowlton).

28. Syrphus ribesii (Linnæus)

Bear's Ears, Elk Ridge (Kartchner); Salt Lake City, 1923 (Knowlton).

29. Syrphus protritus Osten Sacken

City Creek Canyon, July 1925 (Hall).

30. Syrphus pyrastri Hine

Cedar Breaks, July 9, 1925 (Hall and Knowlton); Tony Grove in Logan Canyon, July 1925 (Hall).

31. Syrphus wiedemanii Johns

Mount Ben Lomond, 10,000 feet elevation, July 21, 1925 (Hall).

32. Allograpta obliqua Say

Cottonwood Canyon, July 27, 1925 (Hall and Knowlton); Logan Canyon; Parowan (Tanner).

33. Toxomerus marginatus Say

Blacksmith Fork Canyon, July 17, 1925 (Hall); Bryce Canyon National Park (Rasmussen); Bluff (Tanner); on beets at Clearfield (Knowlton); Dry Lake (Knowlton); Eden, 6000 feet (Hall); Elsinore (Knowlton); Fielding (Knowlton); Glendale (Tanner); Lewiston (Knowlton); Logan (Knowlton); Parowan (Tanner); Provo (Rowe); Providence (Knowlton); Salt Lake City (Knowlton); Tremonton (Knowlton). Also collected at Rim of Grand Canyon, Kaibab Forest, Arizona, June 1927 (Tanner).

34. TOXOMERUS GEMINATUS Say

Corinne 1925 (Hall); Cove, August 24, 1925 (Knowlton); Logan, September 2, 1925 (Knowlton); Logan Canyon (Hall); Provo (Thomas); Wellsville, July 1925 (Hall).

35. TOXOMERUS POLITUS Say

Brigham, July 1925 (Hall); Wellsville.

36. TOXOMERUS BOSCI Macquart

Blacksmith Fork Canyon, July 17, 1925 (Hall).

37. SPHÆROPHORIA CYLINDRICA Say

Blacksmith Fork Canyon, 6000 feet elevation, July 17, 1925 (Hall); Far West (Tanner); Lake Town Canyon, June 1926 (Hayward); Kaysville, June 1926 (Tanner); Logan, June 4, 1923 (Knowlton); Logan Meadows, August 20, 1923 (Knowlton); Lewiston, August 20, 1925 (Knowlton); Paradise, August 18, 1925 (Knowlton). Also collected at Fort Bridger, Wyoming, June 1926 (Hayward and Brown).

38. SPHÆROPHORIA SCRIPTA Linnæus

Bear River City, September 9, 1929 (Knowlton); Blacksmith Fork Canyon, July 17, 1925 (Hall and Knowlton).

39. SPHÆROPHORIA STRIGOTA Staegman

Blacksmith Fork Canyon, July 17, 1925 (Hall).

40. SPHÆROPHORIA INTERRUPTA Jones

Provo (Thomas). Also collected at Mammoth Hot Springs, Yellowstone National Park, July 1929 (Beck); Fort Bridger, Wyoming, June 1926 (Brown).

41. COPESTYLUM MARGINATUM Say

Dividend, May 17 (Spalding).

42. VOLUCELLA COMSTOCKI Williston

Salina, June 28, 1927 (Knowlton).

43. VOLUCELLA ISABELLINA Williston

Salt Lake City, September 14, 1925 (Knowlton).

44. VOLUCELLA SANGUINEA Williston

Aspen Grove, B. Y. U. Campus, Timpanogos, July 1926 (Tanner); Logan Canyon, July 1926 (Knowlton). Also collected at Mink Creek in Immigration Canyon, Idaho, 1925 (Hall and Knowlton); Mammoth Hot Springs, Yellowstone National Park, Wyoming, July 1929 (Beck).

45. VOLUCELLA SATUR Osten Sacken

Copper Mountains, five miles south of Lucin, June 1928 (Tanner).

46. SERICOMYIA CHALCOPYGA Loew

Common in Utah (Hall).

47. ARCTOPHILA FLAGRANS Osten Sacken

Provo Canyon, July 1926 (Spalding).

48. ERISTALIS FLAVIPES Walker

Logan Canyon, July 2, 1925 (Hall and Knowlton).

49. ERISTALIS LATIFRONS Loew

Cedar City, July 3, 1919; Colton (Rasmussen); Eureka, June 19, 1920 (Spalding); Logan, July 1923 (Knowlton); Logan Canyon, 1923 (Knowlton); Miner's Peak, July 13, 1919; Moab (Rasmussen); Raft River Mountains, June 1928 (Tanner); St. George, May 30, 1919; Zion National Park (Tanner). Also collected at Franklin, Idaho, May 24, 1923 (Knowlton); Fort Bridger, Wyoming, June 1926 (Hayward).

50. ERISTALIS MONTANUS Williston

Aspen Grove, B. Y. U. Campus, Timpanogos (Tanner); Hyrum, July 1928 (Knowlton); Logan, August 8 and 20, 1923 (Knowlton).

51. ERISTALIS SAXORUM Wiedemann

Provo (Thomas). Also collected at Black Sands Basin, Yellowstone National Park, Wyoming, July 1929 (Tanner).

52. ERISTALIS TEMPORALIS Thomson

Common at Bountiful, May 8, 1929 (Knowlton); Woods Cross, May 8, 1929 (Knowlton).

53. ERISTALIS TENAX Linnæus

Aspen Grove, B. Y. U. Campus, Timpanogos, July 1926 (Tanner); Bluff (Rasmussen); Cedar City, June 30, 1919; Clover, July 6, 1926 (Knowlton); Dividend, June 1924 (Spalding); Logan, June 9, 1923 (Knowlton); Logan Canyon, August 10, 1925 (Knowlton); Tony Grove, Logan Canyon, July 1925 (Hall); Park City (Olsen); Parowan (Tanner); Provo (Tanner); Trenton, September 15, 1926 (Knowlton); Wellsville Canyon, June 1926 (Tanner). Also collected at Mesa Verde National Park, Colorado (Rasmussen); Moscow, Idaho (Sudweeks).

54. ERISTALIS TRANSVERSUS Wiedemann

Logan, July 1925 (Hall).

55. ERISTALIS BRAUSI Williston

Cache Junction, 1912 (Hagan); Logan, June 1923 (Knowlton); Trenton, September 5, 1926 (Knowlton). Also collected at Fort Bridger, Wyoming, June 1926 (Brown and Hayward).

56. ERISTALIS ARBUSTORUM Linnæus

Aspen Grove, B. Y. U. Campus, Timpanogos, August 1927 (Tanner); Hurricane, July 1925 (Hall); Kaysville, June 1926 (Hayward); Logan, April 18, 1909; Salt Lake City, July 1925 (Hall); Reserve Creek, Raft River Mountains, June 1928 (Tanner). Also collected at Fort Bridger, Wyoming, June 1926 (Hayward).

57. ERISTALIS ANTHOPHORINUS Fallén

Dividend, April 29 (Spalding); Vinyard, April 29 (Spalding).

58. ERISTALIS OBSCURUS Loew

Logan Canyon, June 1925 (Hall).

59. ERISTALIS ÆNEUS Scopoli

Provo (Tanner).

60. ERISTALIS DIMIDATUS Wiedemann

Utah, May 4, 1920 (Spalding).

61. ERISTALIS MEIGENII Wiedemann

La Sal Mountains (Tanner); Parowan, August 1920 (Tanner). Also collected at Lehman Cave, Mount Wheeler, Nevada (Tanner); Mesa Verde National Park, Colorado, June 1927 (Tanner).

62. HELOPHILUS LATIFRONS Loew

La Sal, June 1927 (Kartchner); Logan, May 15, 1923 (Knowlton), July 4, 1923 (Knowlton), July 1925 (Hall); Logan Meadows, July 3, 1929 (Knowlton); Trenton, September 15, 1926 (Knowlton). Also collected at Driggs, Idaho, June 1928 (Kartchner); Fort Bridger, Wyoming, June 1926 (Tanner and Cottam).

63. HELOPHILUS SIMILIS Macquart

Aspen Grove, B. Y. U. Campus, Timpanogos, July 1927 (Tanner); Brigham City (Knowlton); Lewiston (Knowlton); Logan, July 1925 (Knowlton); Logan Peak, July 1925 (Hall); Salt Lake City, 1926 (Knowlton).

64. HELOPHILUS FASCIATUS Walker

Lewiston, June 5, 1929 (Knowlton).

65. ASEMOSYRPHUS MEXICANUS Macquart

Tony Grove, Logan Canyon, July 1925 (Hall).

66. SYRITTA PIPIENS Linnæus

Blacksmith Fork Canyon, July 17, 1925 (Hall); Cedar City, June 28, 1919; Eden, July 1925 (Knowlton); Gunnison, October 1903; Hooper, July 1928 (Knowlton); Hyrum, July 1929 (Knowlton); Lewiston, October 25, 1925 (Knowlton); Little Salt Lake, June 13, 1919; Logan, June 6, 1923 (Knowlton); Ogden, 1928 (Knowlton);

Parowan, July 16, 1919; Richfield, July 1926 (Knowlton); Richmond, June 1929 (Knowlton).

67. Xylota baton Walker

Utah.

68. Xylota flavitibia Williston

Mesa Verde National Park, Colorado, June 1927 (Tanner).

69. Eumerus strigatus Fallén

Lewiston, August 24, 1925 (Knowlton); Wellsville (R. Christensen).

70. Spilomyia interrupta Williston

Aspen Grove, Timpanogos, July 1927 (Tanner); Provo (Tanner).

Note: Mr. Knowlton authorizes me to include six additional species taken by me in Utah in July 1922. *Chilosia petulca* Will., Vivian Park, Park City; *Syrphus intrudens* O. S., Mount Timpanogos; *Mesogramma marginata* Say, White Pine Lake, above Logan; *Sphærophoria sulphuripes* Thom., Salt Lake City; *Polydontomyia curvipes* Wied., Salt Lake City.—E. P. Van Duzee.

THE SYNCHRONIZATION OF LIFE HISTORIES

BY PROF. C. W. WOODWORTH

University of California, Berkeley, California

In the temperate regions, where insects have been most extensively studied, there is in nearly all cases a very definite synchronization in the development associated with the winter rest. This is so evident that we all expect an insect in the spring to appear suddenly and all the individuals to be in the same stage of development, while in the fall there may be specimens in different stages of development, and if more than one brood, we expect to find it in every stage. In some species there is a total mortality in the fall for every stage but one, and in this surviving stage the growth during the cooler weather, either fall or spring, brings most, or all, to a molt or other point of physiological reversal which they cannot pass till the warmer weather of spring. These two causes, acting together, brings the species to a very complete synchronization.

The fundamental thing in the seasonal adjustment of an insect is the mechanism for this developmental synchronization. Below I have attempted to tabulate the outstanding features of this process:

SYNCHRONIZATION

Cause—differential
lethal—
thermal (heat, cold)
dryness
nutritional
dimorphic
Type—mono
bi
di (morphic)
Season—vernal
summer
autumnal
Stage—egg: after maturation
after embrionation
larva: any stadium, particularly (initial, penult, ultimate)
before feeding
before molting
pupa: before adult formation
before emergence
imago: before sexual maturity
between ovipositions

Certain insects in the tropics and parasites on warm-blooded animals may be beyond the influence of seasonal changes, but even in the tropics most insects have accomplished some sort of adjustment associated there with the dry and rainy season rather than with heat and cold.

The length of life of various species vary between seventeen years in a cicada and scarcely as many days in some aphids, and within the same species the different forms of the honey bee may range from perhaps eight years for the queen and in summer perhaps ten weeks for the worker. The great majority of insects, however, are annual brooded with the total length of the life of a generation only a little over twelve months and with each generation completely separated from the preceding and following generation. This we have come to look upon as the normal condition of insect life.

In the case where the life is more than one year, it can be measured by year units, being two or three or four years, and not two and a half, nor any other fraction. Sometimes a species may have individuals requiring two and others taking three years. Some individuals of an annual species may sleep

over to a second summer. There is in all these cases a single seasonal synchronization period which, if passed without the effective reaction, will transfer the individual along to the next period one year later unless it dies in the interim.

Some species may have two or even more synchronizations operating on different stages of the same insect, so that an adult and a larva may both hibernate, the former giving rise to a spring generation and the latter to a fall generation; both remaining quite distinct, or with considerable shifting of individuals from one series to the other.

Where the species has more than one brood a year, there may be two periods of synchronization almost equally effective; for example, the double migration of many aphids show in connection with the wing production in midsummer and fall, resulting in the bringing together of the progeny of three or more generations into a flying swarm of insects, all in precisely the same developmental stage.

More commonly, however, the species proceeds from a synchronized condition in the spring to complete overlapping (what are called "partial broods") in the fall, all to be returned to the synchronized condition by the next spring.

There are two periods in each stadium, one just preceding, and the other just following the molt, where there is a sudden complete change in the physiological activity of every tissue in the body. Normally these changes come in orderly procession, but there may be an interval between the stopping of one function and the starting of the next, so that the entire organism, or nearly all of it, may be brought to a standstill. These potential resting intervals are the points at which the synchronization may be accomplished. Failure or inability of any tissue to stop at one of these intervals is the usual condition making effective the lethal causes mentioned in the table above.

In attempting to classify the life histories, it is necessary to determine the precise stage and season at which synchronization occurs, together with its type and cause. The number of broods is very inadequate without this additional data.

THE PAN-PACIFIC ENTOMOLOGIST
Published quarterly by the Pacific Coast Entomological Society
in coöperation with the California Academy of Sciences
E. P. Van Duzee, Editor S. B. Freeborn, Ph.D., Treasurer

Editorial Comment

The Department of Entomology of the California Academy of Sciences has recently added 292 new insect trays to fill the metal cases purchased a year ago. These trays are 17 x 19 inches in size and 2 inches deep, the standard size now used in this department. They are made in three styles: one with plane wood bottoms for the unit boxes now used for all groups of the smaller insects, one with masonite bottoms for moths and similar insects, and one with glass bottoms for butterflies. In these glass-bottomed boxes are placed from three to nine or more strips of patent compressed cork cut to one-fourth inch in width and attached to the glass by a thin coating of Le Page glue, the number of strips being regulated by the size of the specimens to be placed in the trays. The butterflies, or at least the larger ones, are shingled more or less to save space. This method of mounting butterflies in the trays enables one to study the lower surface as readily as the upper, and has proved entirely satisfactory here. In these boxes the names are written on both sides of the labels so they can be read from below as well as from above. The arrangement of the Coleoptera and Hemiptera into the unit boxes progresses steadily. So far about 750 trays have been filled with rearranged material in the unit boxes. Twenty-five such unit boxes, or their equivalent in half units or double units, just fill one of our standard trays. The systematic arrangement of the Diptera and Hymenoptera, and some of the smaller Neuropteroid orders, must await the purchase of the necessary trays and cases to hold them.

The arrangement of the Academy collection of Sphingidæ, largely the gift of Mr. B. Preston Clark, has just been completed. The Academy series in that family numbers 1270 specimens, representing 287 species or subspecies. A special case has just been secured for the Catocalas and that interesting genus of moths will soon be put into systematic order.

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The numbers of Volume VI of The Pan-Pacific Entomologist were mailed on the following dates: No. 1, October 10, 1929; No. 2, December 19, 1929; No. 3, March 15, 1930; No. 4, May 3, 1930.

E & A

Vol. VI July, 1929 No. 1

IMP. BU
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THE PAN-PACIFIC ENTOMOLOGIST

Published by the
Pacific Coast Entomological Society
in co-operation with
The California Academy of Sciences

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San Francisco, California
1929

THE PAN-PACIFIC ENTOMOLOGIST

Published quarterly in July, October, January and April by the Pacific Coast Entomological Society in co-operation with the California Academy of Sciences.

Annual subscription $2.00 in advance for the United States and Canada; $2.25 for foreign countries. Subscriptions should be sent to the treasurer, Dr. Stanley B. Freeborn, University Farm, Davis, California. Make checks payable to the "Pan-Pacific Entomologist."

Manuscripts for publication and communications regarding non-receipt of numbers, change of address, requests for sample copies, etc., should be addressed to the editor, Mr. E. P. Van Duzee, California Academy of Sciences, Golden Gate Park, San Francisco, California. Advertisements will be accepted for the back cover pages. For rates address the editor or treasurer.

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Published at the California Academy of Sciences, Golden Gate Park, San Francisco, California.

Entered as second-class matter, February 10, 1925, at the postoffice at San Francisco, California, under Act of August 24, 1912.

Vol. VI October, 1929 No. 2

THE PAN-PACIFIC ENTOMOLOGIST

CAS. DUR. ENTOM.

Published by the
Pacific Coast Entomological Society
in co-operation with
The California Academy of Sciences

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Manuscripts for publication and communications regarding non-receipt of numbers, change of address, requests for sample copies, etc., should be addressed to the editor, Mr. E. P. Van Duzee, California Academy of Sciences, Golden Gate Park, San Francisco, California. Advertisements will be accepted for the back cover pages. For rates address the editor or treasurer.

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Published at the California Academy of Sciences, Golden Gate Park, San Francisco, California.

Entered as second-class matter, February 10, 1925, at the postoffice at San Francisco, California, under Act of August 24, 1912.

E&A

Vol. VI January, 1930 No. 3

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THE PAN-PACIFIC ENTOMOLOGIST

Published by the
Pacific Coast Entomological Society
in co-operation with
The California Academy of Sciences

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San Francisco, California
1930

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Ent. 126

Vol. VI April, 1930 No. 4

IMP. DUR. 19 MAR. 1930

THE PAN-PACIFIC ENTOMOLOGIST

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Pacific Coast Entomological Society
in co-operation with
The California Academy of Sciences

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